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THREE NEW SPECIES OF *DEGEERIELLA* NEUMANN (MALLOPHAGA) FROM THE FALCONIFORMES (AVES).

By Theresa Clay.

(*British Museum (Natural History)*).

The three new species of *Degeeriella* described below show an interesting condition of the pulvinus and ventral carinae, and their descriptions are therefore being published in advance of a revision of *Degeeriella* now in preparation.

While attempting to formulate a key to the genera of the Ischnocera it was at one time thought possible to use the characters of the ventral carinae and pulvinus to separate the *Degeeriella*-complex and many of the "lipeurid" genera from the *Brüelia*-complex, the *Cummingsiella* complex and some of the "esthiopterid" genera such as *Ardeicola*. In the former the pulvinus is usually in the form of a simple lobe and the ventral carina either complete or, if interrupted medially, the two carinae pass anteriorly and merge with the general sclerotisation of the head at the anterior edge of the pulvinus; from this point the ventral preantennal suture passes forward either to or near the anterior margin of the head (Clay, 1951 : 180, fig. 13). In the *Brüelia*-complex the ventral carina is always interrupted; the two carinae may or may not be continued to the anterior margin of the head, but each always has a flattened edge parallel to that of the opposite carina to which is attached a lobe of the pulvinus (Clay, 1951, Pl. I, fig. 4). However, two of the new species of *Degeeriella* described below, *guimarãesi* and *meinertzhageni*, have the ventral carinae and pulvinus as in some species of *Brüelia*. Further, it is of interest that in the nymphs of *D. rufa* (Burmeister) from *Falco*, but not in the adults, the form of the pulvinus and ventral carinae resembles that of the adults and nymphs of these two new species. Both these species further resemble *D. rufa* in having some indication of the tergal plates of abdominal segment XI[1] in the males, not apparent in any other known species of *Degeeriella* from the Falconiformes except *D. elani* Tendeiro. *D. guimarãesi* also resembles *D. rufa* in the form of the female genital plate, which has a central posterior prolongation, and in the penis not being joined to the basal apodeme by a central sclerite (the penial sclerite); neither of these characters has been found elsewhere among known species from the Falconiformes. In addition to the characters of the pulvinus and ventral carinae, *D. guimarãesi* and *D. meinertzhageni* resemble each other in having the inner genital sclerites (Clay, 1957 : 339, fig. 5A, *ig*) of the female genital region fused in the middle. *D. elani* Tendeiro and *D. elbeli* sp. n. show a greater development of the ventral carinae compared to most other species of *Degeeriella*. *D. elani* resembles *D. meinertzhageni* in the presence of small tergal plates on segment XI of the male and in the form of the sclerotisation of the tergum of the last segment of the female abdomen.

[1] The interpretation of the terminal segments of the male abdomen is doubtful; the sclerite or sclerites immediately below the fused IX–X (the first apparent segment being II) are here referred to as the tergites of XI.

Host Relationships.

According to Peters (1931), the hosts of the new species described below are placed in two adjacent subfamilies of the family Accipitridae. The subfamily Elaninae contains three genera, of which *Degeeriella* have been seen from *Elanus* and *Chelictinia*. The subfamily Perninae contains six genera, of which *Degeeriella* have been seen from *Elanoides*, *Aviceda* and *Pernis*. These species of *Degeeriella*, with the exception of those from *Aviceda* and *Elanus*, are markedly different from those on the rest of the Accipitridae, and compared with species found on other subfamilies rather diverse amongst themselves. The differences between the male genitalia of the species from *Pernis*, *Elanoides*, *Chelictinia* and *Aviceda*, for instance, are greater than between those of most of the species from the Accipitrinae, Buteoninae, Circinae and Circaetinae combined. For this reason, only very tentative suggestions can be made about their relationship to each other and hence about the relationships between their hosts. As already shown, *D. elani* from *Elanus* and *D. meinertzhageni* from *Chelictinia* have some characters in common and may be related; the latter species also shows relationship to the species from *Elanoides*. In the Perninae, *D. guimarãesi* from *Elanoides* appears to be related to the species from *Chelictinia* and possibly also to that from *Falco*. The species from *Aviceda* is perhaps related to that from *Elanus*. The two species from *Pernis* (*see* Clay, 1957) are distinctive and show no obvious relationship to any other.

Thus, with the exception of *Pernis*, the species included in the subfamily Elaninae and Perninae are parasitised by species of *Degeeriella* which appear to form a related group, those from *Elanoides* and *Chelictinia* being the most alike and that from *Aviceda* being the most distinct; the species found on *Falco* may also belong to this group.

Degeeriella guimarãesi sp. n.

(Pl. I, figs. 1, 4; text-figs. 1, 4, 5, 6, 10, 12, 15).

Type host: *Elanoides forficatus forficatus* (Linn.).

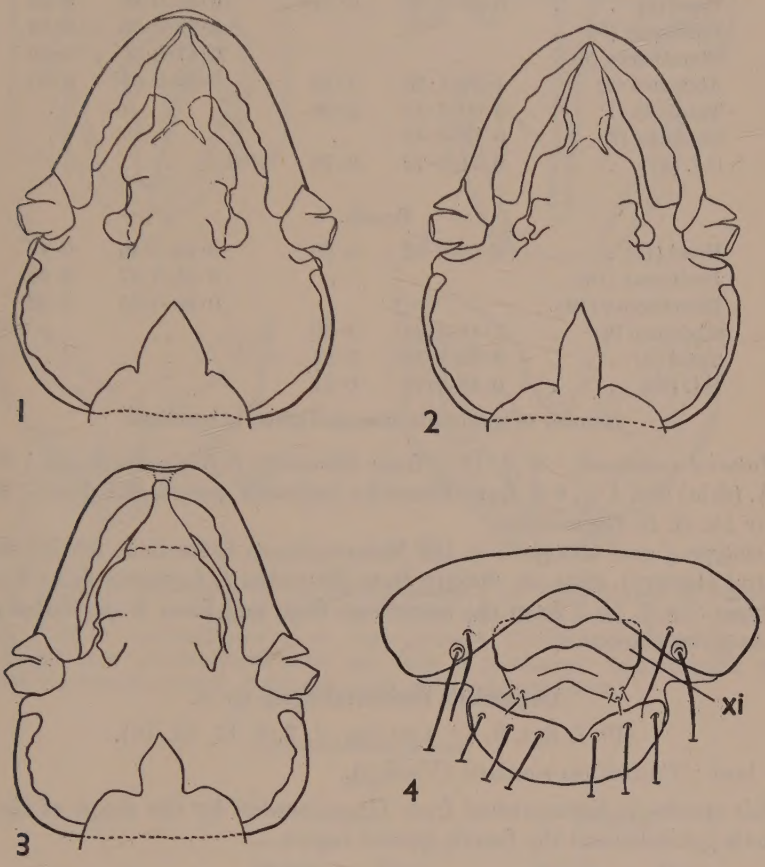
This is a darkly coloured species which differs from *D. meinertzhageni* sp. n. and *D. rufa* (Burm.) in the shape of the head, male genitalia and female genital region; it also differs from *D. rufa* in the form of the pulvinus and ventral carinae.

Male.—Head as in fig. 1; marginal carina reduced centrally with hyaline margin apparent in this area; inner dorsal margin of marginal carina indented medianly; ventral carinae and pulvinus of distinctive form as discussed above; ventral preantennal suture does not reach anterior margin; dorsal preantennal region with sculpturing. Tergites II–III without median indentation, but II usually shows a more lightly sclerotised central concave area; shape of fused terga of IX–X characteristic; tergal thickening of XI present as a single plate which may be interrupted medianly (fig. 4). Pleural thickening narrow (fig. 10).[2] Genitalia as shown in Pl. I, fig. 4 and text-figs. 5–6; penial sclerite present but not joined to penis; setae usually associated with penial arms absent, there is some individual variation in the length of these arms; dorsal endomeral arms may or may not join parameres (fig. 6).

[2] Although the breadth of the pleural thickening is a useful character, it must be remembered that this thickening may become distorted in mounting; the exact details of the " head " of the thickening are also affected by mounting and should be ignored in comparisons.

Female.—Similar to male in form of head and thorax. Tergites IX–XI without a single unsclerotised area round the bases of the two lateral setae each side. Genital region as in figs. 12 and 15; genital plate with median prolongation; inner genital sclerites fused in mid-line and inner edge of vulva toothed.

Chaetotaxy of abdomen.—Tergocentral setae of male: 4[3]; III–IV normally 4, range 4–5;



FIGS. 1–4.—(1–3) Male heads showing details of ventral preantennal region, setae omitted. (1) *D. guimarãesi* sp. n. (2) *D. meinertzhageni* sp. n. (3) *D. elbeli* sp. n. (4) *D. guimarãesi*, terminal segments of male abdomen, dorsal.

V–VI range 4–6; VII–VIII normally 6, range 4–6; X normally 2 + 2, one specimen with 4 + 4. In the female tergocentral setae fewer in number: II–VIII normally 4, range 3–5; X, 2 + 2. Pleural setae: II–V, 0 (two females have one on each side of V); VI–VII, 2 each side; VIII, 3; in the male IX has 2 and X, 0; in the female IX–X, 1–2 each side. Sternocentral setae: II, 2; III–VI normally 4, range 3–4; in the male: VII, 4; VIII, 2; last segment with 1 long and 1 spine-like setae each side; female as in fig. 12. Total number of marginal setae, dorsal and ventral, of the last segment in the male varies from 10–14.

[3] The two anterior setae always found on segment II are not included in this and the following descriptions.

Measurements in mm.

Male.

	Length.		Breadth.	
	Range.	Mean.	Range.	Mean.
Head (9) . .	0·57–0·58	0·575	0·43–0·46	0·44
Prothorax (6) .	.	.	0·32–0·35	0·33
Pterothorax (6) .	.	.	0·47–0·50	0·49
Abdomen (6) .	1·12–1·18	1·15	0·55–0·65	0·60
Total (6) . .	2·00–2·15	2·08	.	.
Genitalia (2) .	0·42–0·44	.	.	.
C.I. (9) . .	0·74–0·79	0·76	.	.

Female.

Head (10) . .	0·58–0·62	0·60	0·45–0·48	0·47
Prothorax (10) .	.	.	0·33–0·37	0·35
Pterothorax (10)	.	.	0·49–0·55	0·52
Abdomen (8) .	1·17–1·38	1·30	.	.
Total (8) . .	2·20–2·33	2·27	.	.
C.I. (10) . .	0·75–0·79	0·77	.	.

Number of specimens measured given in brackets.

Material examined : 9 ♂, 10 ♀ from *Elanoides f. forficatus* (Linn.) Florida, U.S.A. (skin) and 1 ♂, 6 ♀ from *Elanoides forficatus yetapa*, São Paulo, Brasil, lent by Dr. S. R. Guimarães.

Holotype ♂ and *allotype* ♀ in the Meinertzhagen Collection, British Museum (Natural History), slide no. 20584a from *Elanoides f. forficatus* from Florida. *Paratypes :* 9 ♂, 15 ♀ from the same host form and from *E. forficatus yetapa*, data as given above.

Degeeriella meinertzhageni sp. n.

(Pl. I, figs. 2, 5 ; text-figs. 2, 7, 8, 11, 13, 16).

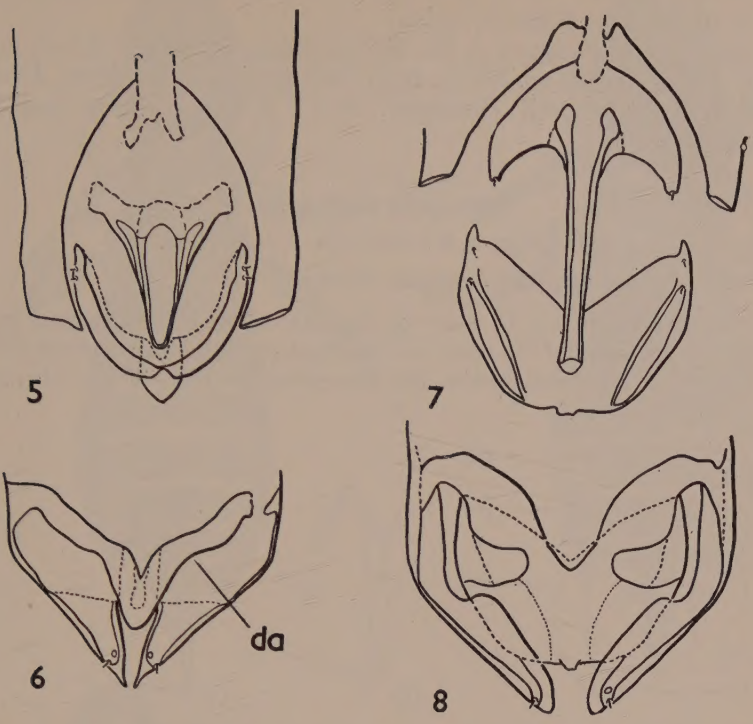
Type host : *Chelictinia riocourii* (Vieillot).

This species is distinguished from *D. guimarãesi* by the shape of the head, the male genitalia and the female genital region.

Male.—Head as in fig. 2 ; inner dorsal margin of marginal carina indented medianly ; ventral carinae and pulvinus as in *guimarãesi*, ventral suture does not reach anterior margin of head. Tergite II with median indentation ; sclerotisation of tergum XI in the form of two small plates variable in size and shape. Pleural thickening as shown in fig. 11. Genitalia as in Pl. I, fig. 5 and text-figs. 7–8 ; there is some variation in the size of the penial arms and in the position of the setae on the ventral endomeral arms.

Female.—Similar to male in form of head and thorax. Tergites IX–XI with a single unsclerotised area round the bases of the two lateral setae each side. Genital plate without median prolongation and with inner genital sclerites fused in the mid-line (fig. 13).

Chaetotaxy of abdomen.—Tergocentral setae : II normally 4, range 3–4 ; III–VII normally 6, range 3–8 ; VIII normally 4, range 4–5 ; X in male has 1–2 each side and in female 2 each side. Pleural setae : II–V, 0 ; VI-VII one each side ; VIII, 3 ; in the male IX has 2 each side and X, 0 ; in the female IX and X each have 1–2 each side. Sternocentral setae : II–VI, 4 ; in the male VII–XI as in *guimarães* ; in the female as shown in fig. 13. In the male total number of marginal setae of last segment varies from 17–24.



FIGS. 5–8.—(5–6) *D. guimarãesi* sp. n., male genitalia. (5) Ventral view of mesosome. (6) Dorsal view of endomeral plate and ends of parameres; *da.*, dorsal endomeral arms. (7–8) *D. meinertzhageni* sp. n., male genitalia. (7) Ventral view of mesosome. (8) Dorsal view of endomeral plate and ends of parameres. (An irregular interrupted line denotes outline of irregular and variable sclerotisation).

Measurements in mm.

Male.

	Length.		Breadth.	
	Range.	Mean.	Range.	Mean.
Head (16) . .	0·50–0·56	0·52	0·38–0·44	0·40
Prothorax (10) .	.	.	0·28–0·31	0·28
Pterothorax (10) .	.	.	0·44–0·50	0·47
Abdomen (10) .	1·13–1·30	1·22	0·57–0·68	0·63
Total (10) . .	2·00–2·21	2·08	.	.
Genitalia (3) .	0·48–0·50	.	.	.
C.I. (16) . .	0·73–0·82	0·77	.	.

Female.

Head (10) . .	0·52–0·57	0·55	0·40–0·45	0·42
Prothorax (5) .	.	.	0·28–0·32	0·30
Pterothorax (5) .	.	.	0·46–0·52	0·49
Abdomen (5) .	1·37–1·44	1·41	.	.
Total (5) . .	2·23–2·37	2·32	.	.
C.I. (10) . .	0·73–0·80	0·77	.	.

Material examined : 16 ♂, 10 ♀ from *Chelictinia riocourii* from Shoa, Abyssinia (skin) and from Kagmar, Sudan.

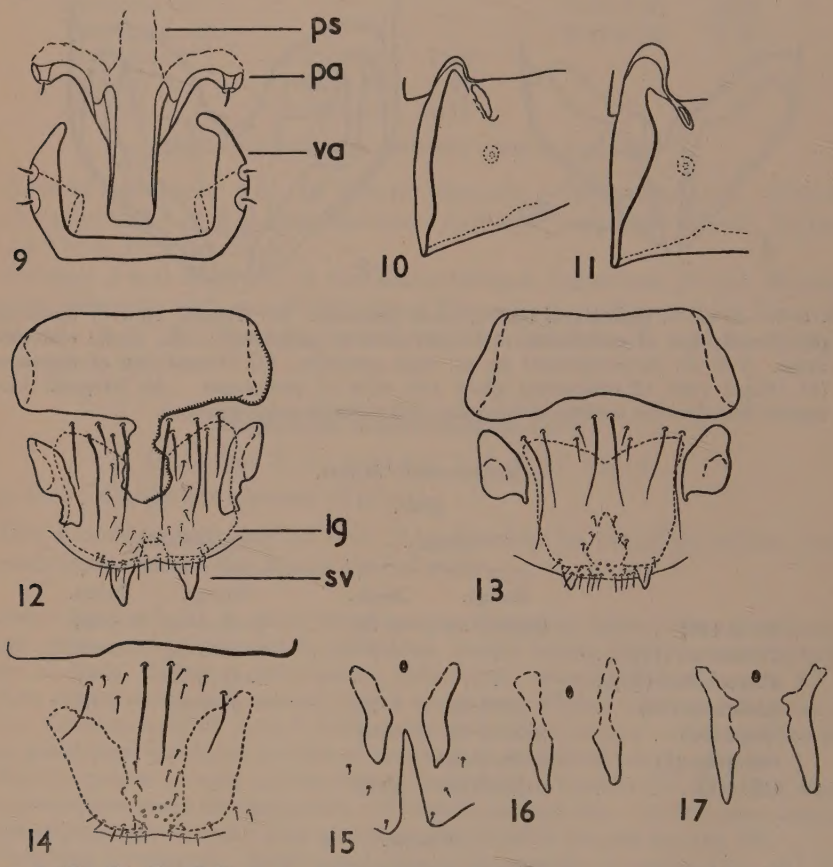
Holotype ♂ and *allotype* ♀ in the Meinertzhagen collection, British Museum (Natural History), slide no. 20583*a* from *Chelictinia riocourii*, Shoa, Abyssinia (*Colonel R. Meinertzhagen*). *Paratypes :* 15 ♂ 9 ♀, from the same host species, data as given above.

Degeeriella elbeli sp. n.

(Pl. I, figs. 3, 6 ; text-figs. 3, 9, 14, 17).

Type host : *Aviceda leuphotes burmana* (Sclater).

This species resembles *D. elani* in the characters of the ventral carinae, but differs in the shape of the head and the male genitalia. Apart from the form of the ventral carinae, this species also resembles members of the *fulva* species group.



Figs. 9–17.—(9) *D. elbeli* sp. n., ventral view of mesosome ; *ps.*, penial sclerite ; *pa.*, penial arm ; *va.*, ventral endomeral arm. (10–11) Male pleural thickening of segment IV. (10) *D. guimarãesi* sp. n. (11) *D. meinertzhageni.* (12–14) Female genital region. (12) *D. guimarãesi* ; *ig.*, inner genital sclerite ; *sv.*, subvulval sclerite. (13) *D. meinertzhageni.* (14) *D. elbeli.* (15–17) Subvulval sclerites and opening of spermathecal tube. (15) *D. guimarãesi.* (16) *D. meinertzhageni.* (17) *D. elbeli.*

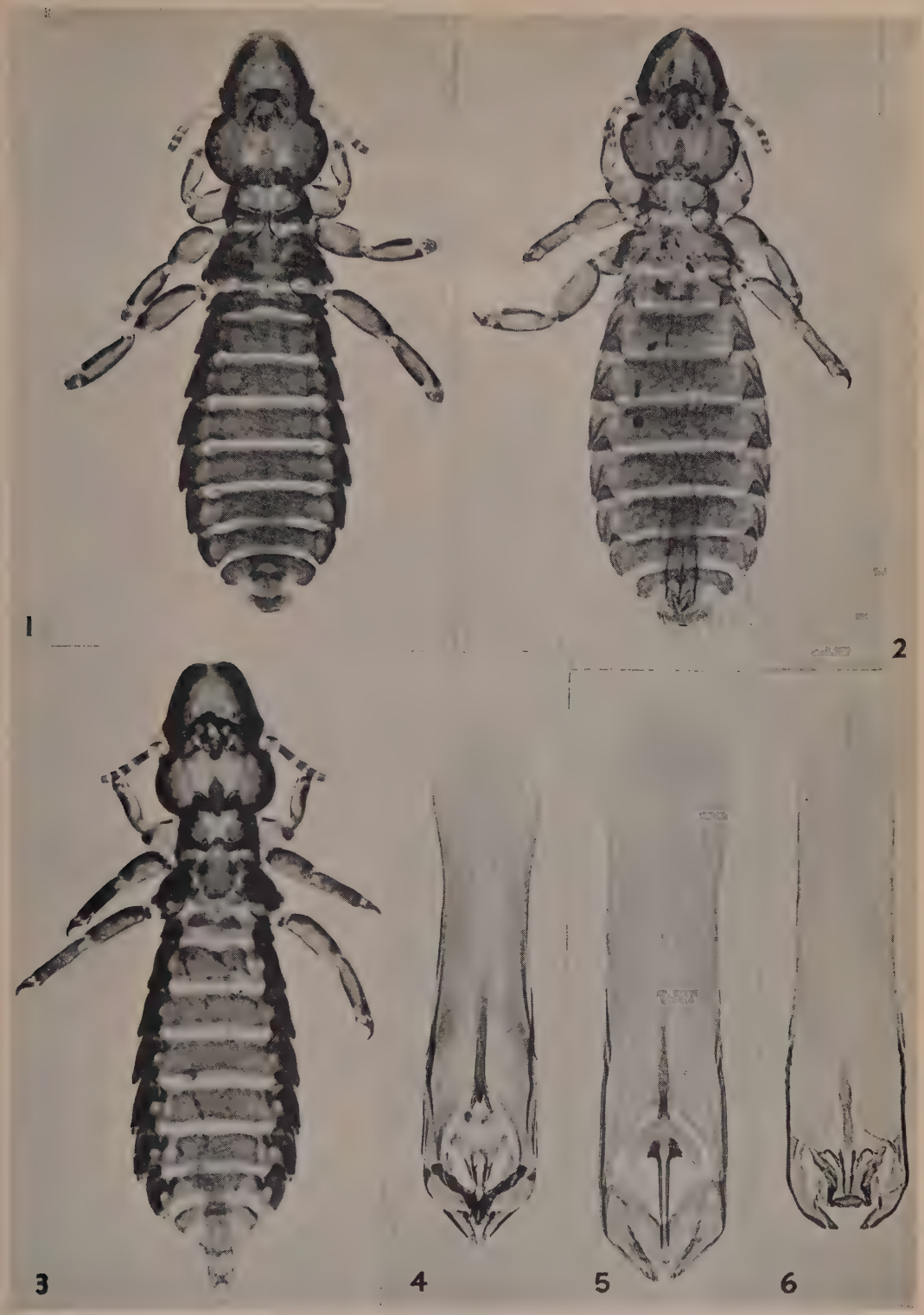


PLATE I.

Figs. 1–3. Males × 45. Figs. 4–6. Male genitalia × 180. (1, 4) *D. guimarãesi* sp. n. (2, 5) *D. meinertzhageni* sp. n. (3, 6) *D. elbeli* sp. n.

Photographs by M. G. Sawyers.

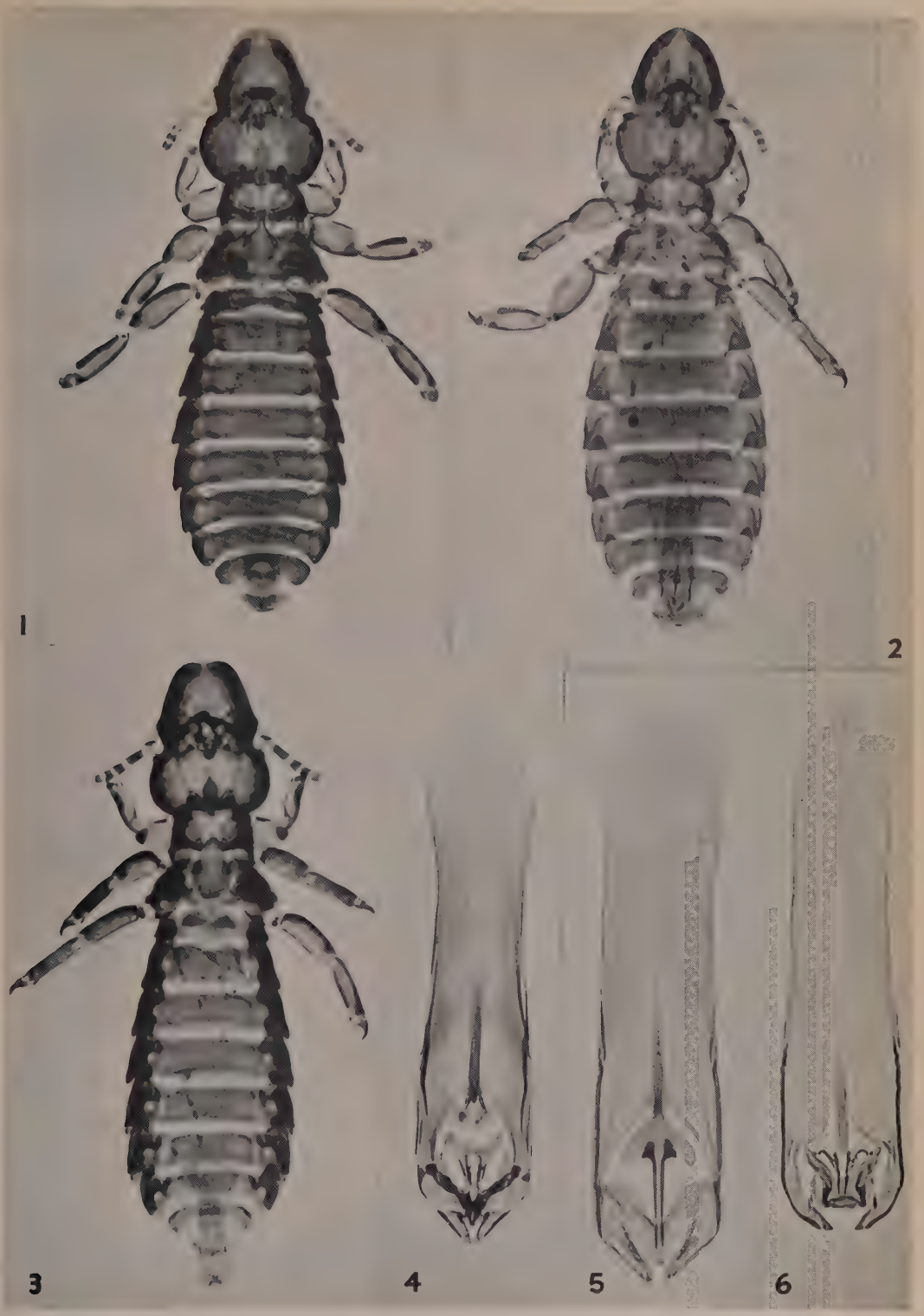


PLATE I.

Figs. 1–3. Males ♂. Figs. 4–6. Male genitalia ♂. 180. (1, 4) *D. guimarãesi* sp. n. (2, 5) *D. meinertzhageni* sp. n. (3, 6) *D. elbeli* sp. n.

Photographs by M. G. Sawyers.

Male.—Head as in fig. 3; inner dorsal edge of marginal carina indented medianly; ventral suture reaches to or in some specimens nearly to the anterior margin. Tergites II and III in the specimens examined show all stages from a slight median concavity to a well-marked slit. Pleural thickening with straight inner margin. Male genitalia as shown in Pl. I, fig. 6 (dorsal) and text-fig. 9 (ventral); dorsal endomeral arms do not join parameres.

Female.—Similar to male in form of head and thorax. Tergites IX–XI without a single unsclerotised area round the bases of the two lateral setae each side. Genital region as shown in figs. 14, 17.

Chaetotaxy of abdomen.—Tergocentral setae: II, 4; III–VII normally 6, range 5–8; VIII varies from 3–7; X in the male with one each side, in female 2 each side. Pleural setae: II–IV, 0; V, 1 each side; VI–VII 2; VIII, 3; in the male IX has 2 each side and X, 0; in the female IX and X each have 1–3 each side. Sternocentral setae: II–VI normally 4; VII–XI in male as in *guimarãesi*, in the female as in fig. 14.

Measurements in mm.

Male.

	Length.		Breadth.	
	Range.	Mean.	Range.	Mean.
Head (17) . .	0·55–0·58	0·57	0·43–0·47	0·450
Prothorax (10) .	.	.	0·30–0·32	0·315
Pterothorax (10) .	.	.	0·48–0·52	0·505
Abdomen (10) .	1·20–1·29	1·25	0·58–0·63	0·620
Total (10) . .	2·12–2·22	2·18	.	.
C.I.(17) . .	0·78–0·80	0·79	.	.
Genitalia (3) .	0·40–0·42	.	.	.

Female.

Head (10) . .	0·59–0·62	0·61	0·47–0·50	0·48
C.I. (10) . .	0·78–0·81	0·80	.	.

Material examined: 23 ♂, 16 ♀ from *Aviceda leuphotes burmana* (W. L. Sclater) from Dansai District, Thailand, 23.iii.1955 (*R. Elbel*).

Holotype ♂ and *allotype* ♀ in the British Museum (Natural History) collection, slide no. 615 from *Aviceda leuphotes burmana* with the above data. *Paratypes* 22 ♂, 15 ♀ from the same host individual.

References.

Clay, T., 1951, An introduction to a classification of the Avian Ischnocera (Mallophaga): I. *Trans. R. ent. Soc. Lond.* **102**: 171–94.

—— 1957, The *Degeeriella* (Mallophaga) parasitic on *Pernis*. *Proc. zool. Soc. Calcutta, Mookerjee Memor. Vol.*: 339–347.

Peters, J. L., 1931, *Check-list of the Birds of the World*, I. Cambridge, Mass., U.S.A.

REMARKS ON THE SYSTEMATIC POSITION OF MYIASIS PRODUCING FLIES (DIPTERA) OF THE AFRICAN ELEPHANT, *LOXODONTA AFRICANA* (BLUMENBACH)[1]

By F. Zumpt

(*Department of Entomology, South African Institute for Medical Research, Johannesburg*)

Introduction

The African elephant harbours no less than five monotypic genera of myiasis producing flies, all of which are morphologically outstanding, both in the adult and larval stages. The systematic position of these genera has been an enigma ever since their discovery. Only a few authors have been able to study the adult flies, which have to be reared from the mature larvae. As far as I am aware, not one of these flies has ever been caught in the field, because all of them are non-feeding and have therefore only a very short imaginal life.

Through the kindness of Dr. P. L. G. Benoit of the Congo Museum, Tervuren, I have been able to study several adults and larvae of the flies concerned. I have also received specimens from Dr. F. Peus, Zoological Museum, Berlin; Dr. M. Beier, Museum of Natural History, Vienna; and Dr. J. A. T. Santos Dias, Lourenço Marques. Finally, thanks to Mr. T. J. Steyn, Director of Nature Conservation in the Transvaal, who arranged for me to be present at the shooting of a marauding elephant, I was able to collect the larvae of *Platycobboldia loxodontis*. I wish to thank all these colleagues very sincerely for their help.

The myiasis producing flies of *Loxodonta africana* may be separated in the third larval stage according to the following key:

1 (2) Posterior peritremal plates with a great number of pores; segments with rows of little spines at the anterior margins and one row of broader spines near the middle. In the oesophagus
Pharyngobolus africanus Brauer

2 (1) Posterior peritremal plates with 3 slits; plates either exposed or hidden in a cavity 3

3 (6) Posterior spiracles represented by horizontal slits, peritremes separated from each other and partly reduced; segments provided dorsally and ventrally with scales which are not arranged in rows but are almost uniformly distributed. Larvae develop in the skin 4

4 (5) Posterior spiracles not visible in the dead larva, but completely hidden in a dorsally closed cavity; body of elongate-oval shape, segments III–XI dorsally and ventrally uniformly covered with scales; mouth-hooks very small. In the sole of the foot
Neocuterebra squamosa Grünberg

5 (4) Posterior spiracles exposed; body pear- or egg-shaped, segments partly with areas free of scales; mouth-hooks bigger and quite distinct. In the skin of back and pleura
Ruttenia loxodontis Rodhain

[1] This research work has been partly financed by the South African Council for Scientific nd Industrial Research.

6 (3) Posterior spiracles represented by vertical slits, peritremes united; segments dorsally and ventrally with spines arranged in distinct rows; body elongate, of typical muscoid shape, pointed anteriorly, broadly truncate posteriorly. Larvae develop in the gut . . 7

7 (8) Posterior segments without lateral papillae
Platycobboldia loxodontis (Brauer)

8 (7) Posterior segments each with a pair of laterally placed, conical papillae . . **Rodhainomyia chrysidiformis** (Rodhain and Bequaert)

Pharyngobolus africanus Brauer

Pharyngobolus africanus Brauer, 1866, *Verh. zool.-bot. Ges. Wien* **16**: 883, pl. 19, fig. 1; Rodhain and Bequaert, 1915, *Bull. Soc. Path. exot.* **8**: 766; et 1919, *Bull. biol. Fr. Belg.* **52**: 388, fig. 2; Rodhain, 1927, *Ann. Parasit. hum. comp.* **5**: 201, figs.

The imago is known to me only from the description by Rodhain (1927). I have received two larvae III and one larva II from the River Kasai, Belgian Congo. I dissected the posterior peritremes of these larvae and found them to be of typical oestrid structure. The adults also fit into the limits of the family Oestridae, and most probably this species would fall into the Oestrinae.

Neocuterebra squamosa Grünberg

Neocuterebra squamosa Grünberg, 1906, *S.B. Ges. naturf. Fr. Berl.* **1906**: 46, figs. 6–9; Rodhain and Bequaert, 1919, *Bull. Sci. Fr. Belg.* **52**: 381, fig. 1; Rodhain, 1927, *Ann. Parasit. hum. comp.* **5**: 194, figs.

Grünberg based this species on third instar larvae from the Cameroons. Later, Rodhain and Bequaert received several specimens from the Belgian Congo. The larvae of the third and the second stages have been found in the dermal tissue of the sole.

I have received from Yangambi, Belgian Congo, two larvae of the third stage which measure approximately 23 mm. in length, with a greatest width of 12 mm. They are probably mature. Rodhain and Bequaert (1919) and Rodhain (1927) have given detailed descriptions of the second and third larval stages as well as of the puparium. The larvae are composed of the usual 12 segments, but superficially only ten can be counted, because the boundaries between the first two and the last two are ill-defined. Segments III–XI are uniformly covered with black-brown scales. The mouth-hooks are strongly reduced and from outside only detectable as a pair of black dots. The small posterior spiracles are completely hidden in a groove closed by a vertical, lip-like structure. The dissected spiracles comprise three slits. The peritreme (fig. 1) is strongly reduced, only the outer margin remaining.

The larval morphology of *N. squamosa* is, therefore, strongly reminiscent of that of *R. loxodontis*, which also develops in the dermal tissue. The morphology of the adult fly, however, shows no similarity to the other species. Both sexes have been described by Rodhain (1927). The adults are large, stout flies with glossy, metallic black-blue and sparsely haired bodies. One male before me, from Buta in the Belgian Congo, measures 23 mm. in length. The postscutellum forms a prominent bulge. The hypopleural bristles have become hair-like; they are greatly increased in number and form a kind of brush, similar to that found in the Cuterebridae of the New World. Such a modification of the hypopleural bristles is also found in the Calliphoridae (e.g. *Trichoberia lanata* (Villen.))

and in the Tachinidae (e.g.. *Aulacephala maculithorax* Macquart) and is, therefore, not characteristic of the Cuterebridae. There is another morphological feature of importance, in respect of which *Neocuterebra* does not coincide with the Cuterebridae. The mouth-parts of *Neocuterebra* are vestigial as in the true Oestridae, the Gasterophilidae and the Aulacephalini of the Tachinidae. In the Cuterebridae, however, they are evidently still functional and somewhat

FIG. 1.—*Neocuterebra squamosa* Grünberg. (*a*) Third larval stage in ventral view. (*b*) An isolated scale. (*c*) One posterior spiracle with the reduced peritreme.

similar to those of the Tabanidae (*comp.* Bennett, 1955). In the Cuterebridae, in contrast to *Neocuterebra*, the postscutellum does not form a bulge. This feature has been used by many authors to separate the Calliphoridae from the Tachinidae, and in the usual keys to the families of Diptera, for instance those given by van Emden (1944) or by Mesnil (1944), *Neocuterebra* runs down to the Phasiinae of the Tachinidae.

Van Emden (1944) assigned to the Phasiinae two tribes with vestigial mouth-parts, namely the Aulacephalini and the Oestrini. The whole Oestrini-complex *sensu* van Emden was removed from the Tachinidae by Zumpt (1957). The species were distributed either to the Oestridae, raised again to the rank

of a distinct family, or to the Gasterophilidae. The former are characterised in the larval stage by pored posterior peritremes, which are separated from each other, the latter by united peritremes with vertical slits. *Neocuterebra* would not fit into either of these two families, because in the third larval stage it has reduced and separated peritremes with almost horizontal slits.

The peritremes of the *Neocuterebra* larvae are not unlike those found in some of the true Tachinidae. On the other hand, the adult features coincide with those characterising the Phasiinae, and especially the tribe Aulacephalini of this subfamily. *Neocuterebra* resembles *Aulacephala* in having vestigial mouth-parts and hair-like and increased hypopleural bristles. The general structure of the head, including the bare arista, and of the hypopygium (fig. 2) is also

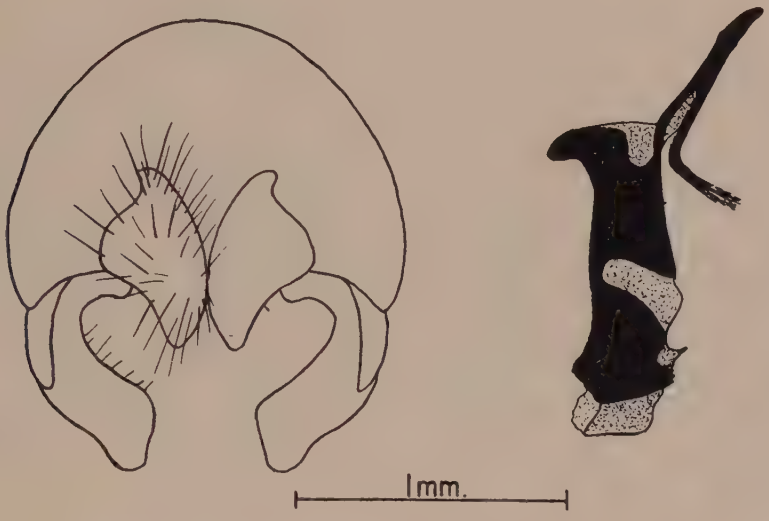


Fig. 2.—*Neocuterebra squamosa* Grünberg. Cerci with paralobi and phallosome.

similar in these two genera. There are, however, quite a number of other features, which do not permit the assignment of *Neocuterebra* to the tribe Aulacephalini, and it is proposed to erect for *Neocuterebra* a distinct tribe belonging to the Phasiinae.

Unfortunately, no larval stage of the Aulacephalini is known; that they are parasitic may be deduced from the fact that the adults have vestigial mouth-parts, and it is even probable that they develop in a vertebrate host. All other Tachinidae develop in arthropods, and Hennig (1952) may have been quite right when he indicated that those genera living as parasites of vertebrates, and assigned to the Tachinidae (Larvaevoridae) by some authors, probably do not belong to this family at all. It is, therefore, possible that the discovery of the life-cycle of the Aulacephalini may provide us with further evidence in support of a closer relationship to the Neocuterebrini, and may perhaps show that both tribes should be placed into another distinct family. But I do not want to draw premature conclusions.

Ruttenia loxodontis Rodhain

Ruttenia loxodontis Rodhain, 1924, *Bull. Soc. Path. exot.* **17** : 86, fig. 1 ; 1927, *Ann. Parasit. hum. comp.* 5 : 198, figs. ; Séguy, 1937, *in* Wytsman, A., *Gen. Insect, Diptera* fasc. 205 : 368, figs.

Rodhain based this species on the third larval stage, of which he received several specimens from Api, Uele, Belgian Congo. They had been extracted from skin-boils on the upper legs and flanks. Later, he also received adults and was able to complete the description of the species. However, Rodhain did not come to a decision about the systematic position of this curious fly. He

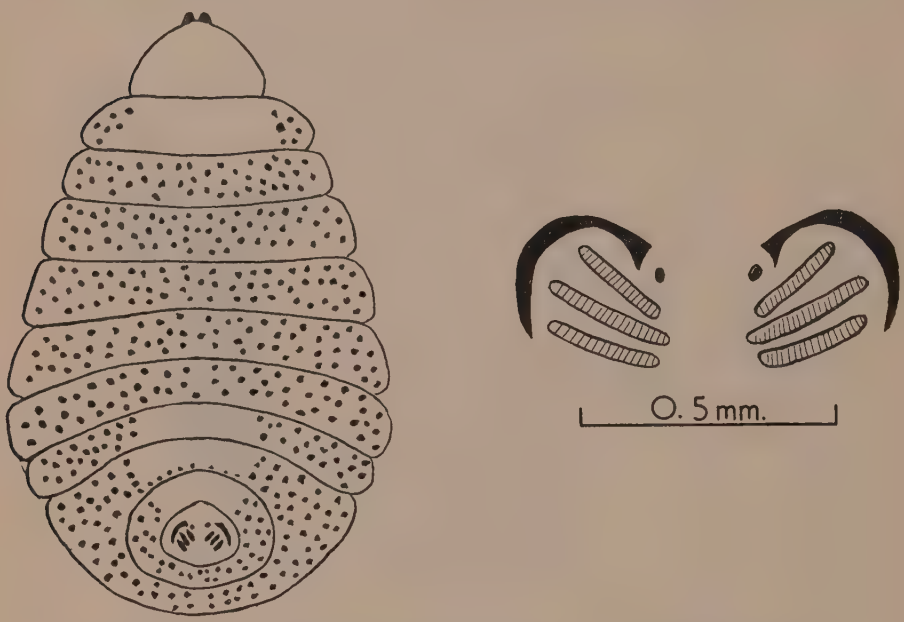


Fig. 3.—*Ruttenia loxodontis* Rodhain. Dorsal view of third larval stage. Posterior spiracle enlarged.

says that it cannot be referred either to the Hypoderminae or to the Cuterebrinae, but that it occupies a place apart among the Oestridae *s. lat.*

I have been able to examine three larvae of the third stage, one puparium and one male fly, all from the Belgian Congo.

The length of the third stage larvae is given by Rodhain as varying from 7 to 10 mm. My larvae fall within this range, but they appear to be slightly shrunken, so that the mature larva would presumably slightly exceed 10 mm. when alive. The colouring of the body is yellow ; the scales which uniformly cover most parts of the segments are dark brown. The normal 12 segments are present, the first two being ill-defined. The mouth-hooks are small, but distinct, the protruding part being of triangular shape. The posterior spiracles are exposed and are represented by three pairs of slits which, when observed from the ventral side, slope slightly inwards. The peritremal margin is distinct

only on the outer side (*comp.* fig. 3.) The structures would indicate that *R. loxodontis* belongs neither to the Oestridae *s. str.*, as defined by Zumpt (1957), nor to the Gasterophilidiae, but to the Muscidae, where it has been placed by Séguy (1937).[2]

Rodhain (1927) has given a good description of both sexes, accompanied by several figures. The second antennal segment shows a distinct cleft which makes it clear that *R. loxodontis* belongs to the Calyptrata. The hypopleural bristles are wanting and the mouth-parts reduced, consisting of a small, cone-shaped proboscis and a pair of non-segmented, globular palps. The structures would coincide with similar findings in *Gasterophilus*. The wing venation, however, and the leaf-like shape of the arista are quite outstanding in this family as well as in the Muscidae, so that, if placed in either of these two families, *Ruttenia* would acquire the status of a distinct subfamily. Unfortunately, the hypopygium could not be dissected from the single specimen before me.

In order to solve the problem of the systematic position of *Ruttenia*, we have to refer again to the structure of the posterior spiracles of the third larval stage. The slits, three in number, are almost transversely directed, not vertically, as in primitive Gasterophilidae, and the two stigmal plates are separated from each other and not united as in the Gasterophilinae, Gyrostigminae and Cobboldiinae. Almost transverse slits on separate plates are, however, found in several groups of Muscidae. I believe the best solution would be to list the Rutteniinae as a subfamily of the Muscidae, as already done by Séguy (1937).

There is still another family of myiasis producing flies, the Cuterebridae of the New World. The larvae also show slitted peritremes separated from each other, but in the primitive forms these slits are arranged vertically. The adults, furthermore, show well-developed mouth-parts somewhat resembling those of the male tabanids, and there are also several more features of phylogenetic importance (*see* Zumpt, 1957, appendix) which definitely exclude the assignment of *Ruttenia* to the Cuterebridae.

Platycobboldia loxodontis (Brauer)

Cobboldia loxodontis Brauer, 1896, *Denkschr. Akad. Wiss. Wien* **64** : 267 ; Rodhain and Bequaert, 1915, *Bull. Soc. Path. exot.* **8** : 769 ; 1919, *Bull. Sci. Fr. Belg.* **52** : 412, figs. 3–7 ; Gedoelst, 1923, *Ann. Parasit. hum. comp.* **1** : 354 figs. 1–3.
Platycobboldia loxodontis Townsend, 1934, *Ent. News*, **45** : 277.
Cobboldia parumspinosa Gedoelst, 1915, *Rev. zool. afr.* **4** : 185 ; 1923, *Ann. Parasit. hum. comp.* **1** : 362.

This species, together with *Rodhainomyia chrysidiformis* (Rodh. and Bequ.), is usually placed in the genus *Cobboldia* Brauer, which was erected for the Gut Bot of the Indian elephant, *C. elephantis* (Steel). The larvae of these two species are similar to one another, but the adults differ so greatly that I think they should be regarded as belonging to distinct genera.

I have already discussed the systematic position of *Platycobboldia* in my paper on the classification of the Oestridae *s. lat.* (Zumpt, 1957). Together with the two other genera of elephant gut flies, it forms the subfamily Cobboldiinae of the Gasterophilidae.

[2] The figure of the larva given by Séguy (1937, pl. 2, fig. 21) does not refer to *Ruttenia* but to *Platycobboldia*.

Rodhainomyia chrysidiformis Rodhain and Bequaert

Cobboldia chrysidiformis Rodhain and Bequaert, 1915, *Bull. Soc. Path. exot.* **8** : 773 ; **1919**, *Bull. Biol. Fr. Belg.* **52** : 421, figs.
Rodhainomyia chrysidiformis Bequaert, 1920, *Bull. Soc. ent. Fr.* **89** : 68.
Cobboldia roveri Gedoelst, 1915, *Rev. zool. afr.* **4** : 156.

I have seen only one female of this species. According to the description, the third larval stage is similar to that of *Platycobboldia*, the posterior spiracles having the same structure.

Summary

There are five monotypic genera of Diptera the larval stages of which are known to parasitise the African elephant, *Loxodonta africana* (Blumenbach). On the basis of their larval and adult characters, these genera are assigned to four different families :

Pharyngobolus	Oestridae, subfam. Oestrinae.
Neocuterebra	Tachinidae, subfam. Phasiinae.
Ruttenia	Muscidae, subfam. Rutteniinae.
Platycobboldia, *Rodhainomyia* . .	Gasterophilidae, subfam. Cobboldiinae.

A key is given to the third larval stages.

References

Bennett, G. F., 1955, Studies on *Cuterebra emasculator*, Fitch, 1856 (Diptera : Cuterebridae) and a discussion on the status of the genus *Cephenomyia* Ltr., 1818. *Canad. J. Zool.* **33** : 75–98.

Hennig, W., 1952, *Die Larvenformen der Dipteren.* III. Berlin. 628 pp.

Mesnil, L., 1944, Larvaevorinae (Tachininae). *In* Lindner, *Flieg. pal. Reg.* **64**(g) : 17.

Rodhain, J. and Bequaert, J., 1919, Materiaux pour une étude monographique des Diptères parasites de l'Afrique. Part III. Diptères parasites de l'élephant et du rhinoceros. *Bull. Sci. Fr. Belg.* **52** : 379–465.

Rodhain, J., 1927, Contribution à la faune des oestridés du Congo Belge. *Ann. Parasit. hum. comp.* **5** : 193–213.

Séguy, E., 1937, Diptera, fam. Muscidae. *In* Wytsman, *Gen. Insect.* Fasc. 205. 604 pp.

Van Emden, F., 1944, Keys to the Ethiopian Tachinidae. I. Phasiinae. *Proc. zool. Soc. Lond.* **114** : 389–436.

Zumpt, F., 1957, Some remarks on the classification of the Oestridae, *s. lat.* (Diptera). *J. ent. Soc. S. Afr.* **20** : 154–61.

ON SOME SAWFLIES (HYMENOPTERA SYMPHYTA) FROM NEW GUINEA

By Robert B. Benson

(*British Museum (Natural History)*)

Among some sawflies from New Guinea sent to me recently by Dr. Lieftinck (Leiden) were representatives of an undescribed species of *Lophyrotoma* Ashmead, 1898 (= *Platypsectra* Benson, 1938, **syn. nov.**), a genus not previously known to occur outside Australia. There were also specimens of *Ancyloneura nigripes* Smith and *A. varipes* Cameron and I take this opportunity of providing a new key to the species of *Ancyloneura* to show how these and the other species can be distinguished from each other.

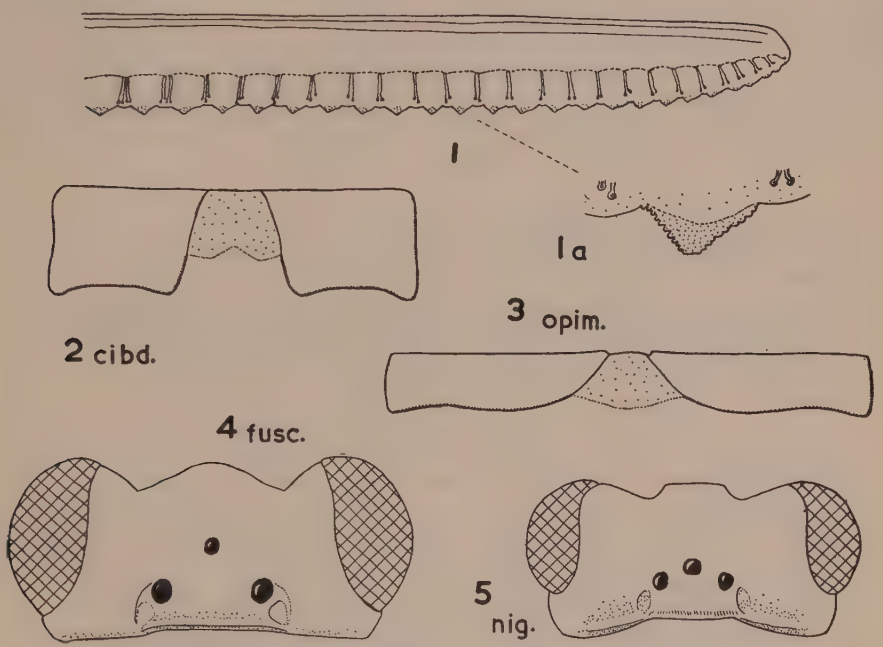


Fig. 1–5.—(1) Saw of *Lophyrotoma cibdeliformis* sp. n.; (1*a*) enlarged 15th tooth thereof. (2–3) Male hypopygium in: 2, *Lophyrotoma cibdeliformis*; 3, *L. opima* Konow. (4–5) Head from above in: 4, *Ancyloneura fuscipennis* Benson; 5, *A. nigripes* Smith.

Lophyrotoma cibdeliformis sp. n.

Female

Metallic violet-blue all over except for yellowish-white membrane showing medially behind apical tergite. Wings in type and 2 females hyaline except for smoky smudge along fore part of fore wing from cell *C* and apex of cell *R* to apex of wing; in one female, however, smoky patch of wing also extends from cell 1 *M* to cover entire base.

Head strongly contracted behind in dorsal view; eye about twice as long as head behind eye; antenna 24 to 25-segmented; labium shorter than breadth of clypeus; eyes

in front view more than half as high as far apart (0·6 : 1·0); malar space about twice as long as distance between antennal sockets. *Mesonotum* about one and one-third times as wide as head. *Legs* with hind tarsus about as long as tibia; basitarsus about one and one-third times as long as next tarsal segment and much longer than apex of hind tibia (1·8 : 1·0). *Abdomen* normal except for the proportionally longer and deeply excised hypopygium (*cf.* fig. 2 with that of *L. opima* Konow, fig. 3). *Sculpture* and *Pubescence:* head and thorax shining and almost impunctate; abdomen with coriaceous sculpture developed on tergites; pubescence very sparse, mainly on face, pronotum, middle lobe of mesonotum and upper mesopleura. *Saw* figures 1 and 1*a*. *Length* 13·5 to 14·5 mm.

Male

As in female except for sexual characters. Antenna with more than 18 segments (apex broken) bearing long rami (on third segment ramus about 6 times as long as breadth of segment). Hypopygium broadly rounded at apex. *Length* 10 mm.

New Guinea, W.C.: Wisselmeren, Paniai, 1750 m., ix–xi.1939, 4 ♀ (including holotype), 1 ♂ (*H. Boschma*). Holotype ♀ and 1 ♀ and 1 ♂ in Leiden Museum; 2 ♀ in British Museum (Nat. Hist.).

In my key to *Lophyrotoma* (= "*Platypsectra*") (Benson, 1938) this species runs to couplet 10 which consists of two species, *analis* Costa and *ramosa* Benson; from both of these the new species is at once distinguished by its larger size and its uniform metallic colouring. It also differs from all previously known species in the genus in its head being strongly contracted behind in dorsal view, in its long many-segmented antenna (24–25 segments) and in the form of the female hypopygium (*cf.* figs. 2 and 3) and saw.

Ancyloneura Cameron

Benson (1934) redefined the genus *Ancyloneura*, endemic to New Guinea, and gave a key to the females of the known species. More material that has come to hand, chiefly from Miss Cheesman's expeditions in 1934, 1936 and 1938, enables me now to key both sexes and shows that I was mistaken in synonymising *A. varipes* Cameron (= *wollastoni* Rohwer) with *A. nigripes* Smith.

Key to Species of *Ancyloneura* Cameron

(Body all black. Length 4–5·5 mm.).

1 Antenna 10–13 segmented and piceous throughout. Hind basitarsus not as long as rest of tarsus 2

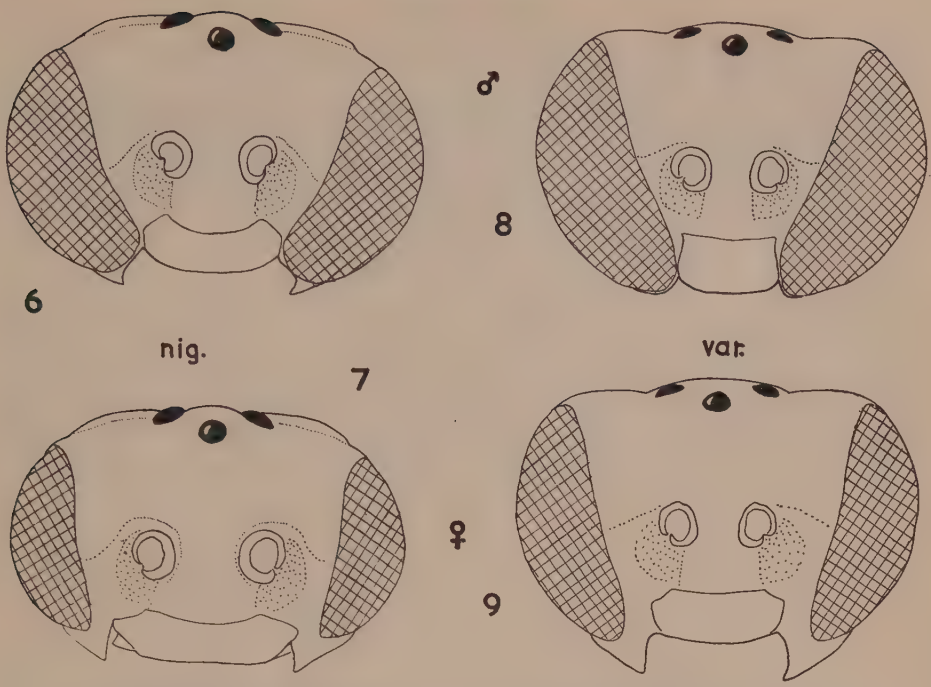
– Antenna 15-segmented, piceous but with the basal segments sordid white. Hind basitarsus longer than rest of tarsus.

Sawsheath in dorsal view with long curved apical setae (Benson, 1934, fig. 7*c*). *Pubescence normal* (*fuscous on head and mesonotum; silvery on mesopleura*). New Guinea: Salwatty (♂ not known) . . . . . ♀ **annulicornis** Benson

2 (1) Eyes less strongly converging [in female further apart in front than height of an eye (fig. 7); in male further apart than half height of eye (fig. 6)]. Femora often entirely black 3

– Eyes more strongly converging [in female closer together in front than height of an eye (fig. 9); in male closer together than half height of an eye (fig. 8)]. Hind femur reddish-yellow with only extreme base black.

Sawsheath in dorsal view with long curved setae (1934, fig. 7*c*). *Antenna* 12-*segmented. Pubescence normal.* New Guinea: Humboldt Bay; Aru Isle; and Jappen Isle at 1000 feet ♂♀ (= *wollastoni* Rohwer) **varipes** Cameron



Figs. 6–9.—Head from in front to show size and convergence of eyes in: (6) *Ancyloneura nigripes* Smith ♂; (7) *A. nigripes* ♀; (8) *A. varipes* Cameron ♂; (9) *A. varipes* ♀.

3 (2) Cell 1 + 2 *Rs* of hind wing open at base through partial breakdown of vein 1*rm*. Sawsheath from above with curved apical setae longer than breadth of sheath (1934, figs. 7*a* and 7*c*) 4

– Cell 1 + 2 *Rs* of hind wing closed basally. Sawsheath from above with short, almost straight apical setae, not as long as breadth of sheath (1934, fig. 7*b*).

Antenna 12-*segmented*. *Pubescence normal*. Papua: Owen Stanley Range, 1300 m. . . . . ♂♀ **brevisetosa** Benson

4 (3) Lateral ocelli about one and a half times as far from nearest eye margin as from each other (fig. 5); hind margin of temples each side of postocellar area with a clear, almost carinate, edge. Antenna 10–11 segmented. Sawsheath in dorsal view with its curved apical setae overlapping apically (1934, fig. 7*c*). Pubescence fuscous on mesopleura as well as on head and mesonotum.

New Guinea: Mt. Pania *c.* 6000 feet and Salwatty. Papua: Tafa, 8500 feet. . . . . ♂♀ **nigripes** Smith

– Lateral ocelli about as far from nearest eye-margin as from each other (fig. 4); hind margin of head sharply edged only behind lateral furrows of postocellar area. Antenna 12-segmented. Sawsheath in dorsal view with curved apical setae not overlapping at their apices (1934, fig. 7*a*). Pubescence normal (fuscous on head and mesonotum; silvery on mesopleura).

New Guinea: Humboldt Bay; Salwatty; and Waigeu Island at 2500 feet . . . . . ♂♀ **fuscipennis** Benson

References

Ashmead, W. H., 1898, Classification of the Horntails and Sawflies of the Suborder Phytophaga. *Canad. Ent.* **30** : 230.

Benson, R. B., 1934, A classification of the Sawflies of the family Pterygophoridae, with a revision of the Australian members of the subfamily Euryinae (Hymenoptera Symphyta). *Trans. R. ent. Soc. Lond.* **82** : 461–78, 9 figs.

—— 1938, A revision of the genus *Pterygophorus* Klug. *sensu lato*, with the description of two new genera (Hymenoptera Symphyta). *Ann. Mag. nat. Hist.* (11) **1** : 610–25, 13 figs.

TYNDALLHYDRUS CORIACEUS RÉGIMBART AND *T. CAPENSIS* OMER-COOPER (COLEOPTERA : DYTISCIDAE) TRANSFERRED TO A NEW GENUS, *SHARPHYDRUS*

By Joyce Omer-Cooper

(*Rhodes University, Grahamstown, South Africa*)

The genus *Tyndallhydrus* of the tribe Bidessini, subfamily Hydroporinae, was created by Sharp for *T. caraboides* (fig. 1*a*) from South Africa (Sharp, 1882). In this insect the prosternal process does not reach the intercoxal process of the metasternum, being depressed in front of the mesocoxae which are quite contiguous, and the outline of the body is very discontinuous, the base of the pronotum being considerably narrower than the base of the elytra.

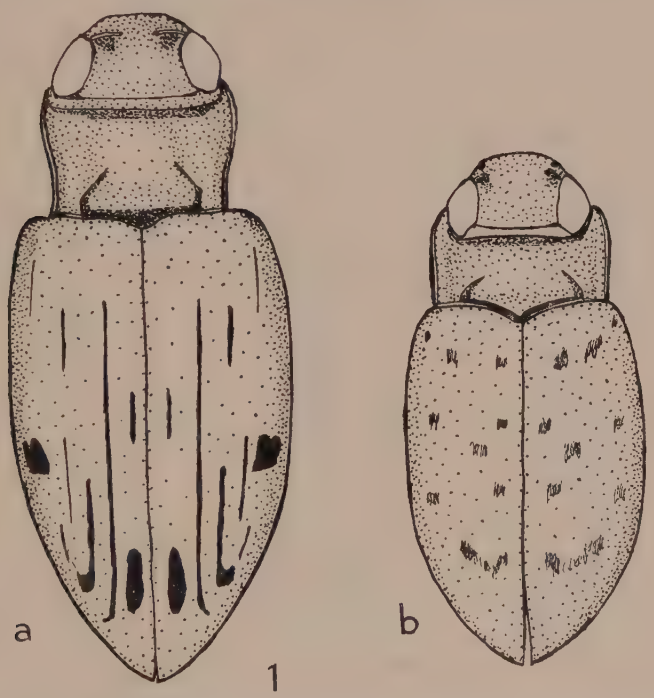


Fig. 1.—(*a*) *Tyndallhydrus caraboides* Sharp. (*b*) *Sharphydrus coriaceus* (Rég.).

In 1895 *coriaceus* (fig. 1*b*) was added to the genus by Régimbart, and in 1955 a keeled species, *capensis*, was added with reservations as to the legitimacy of placing either of these species in the genus *Tyndallhydrus* (Omer-Cooper, 1955).

In both *capensis* and *coriaceus* the prosternal process does reach the metasternum ; in both the upper surface is coriaceus, which it is not in *T. caraboides*,

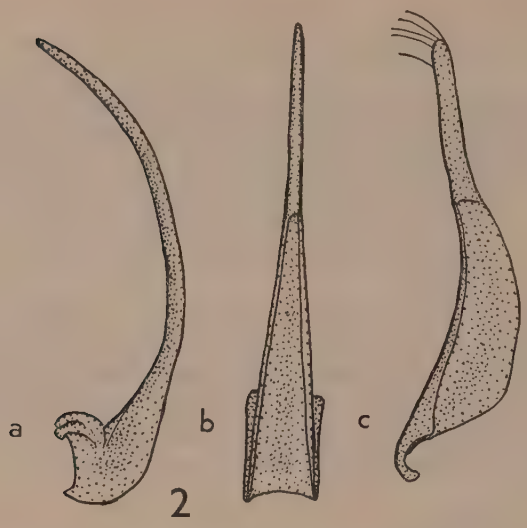


Fig. 2.—Aedeagus of *T. caraboides*. (*a*) Median lobe, side view. (*b*) Median lobe, dorsal view. (*c*) Paramere, inside view.

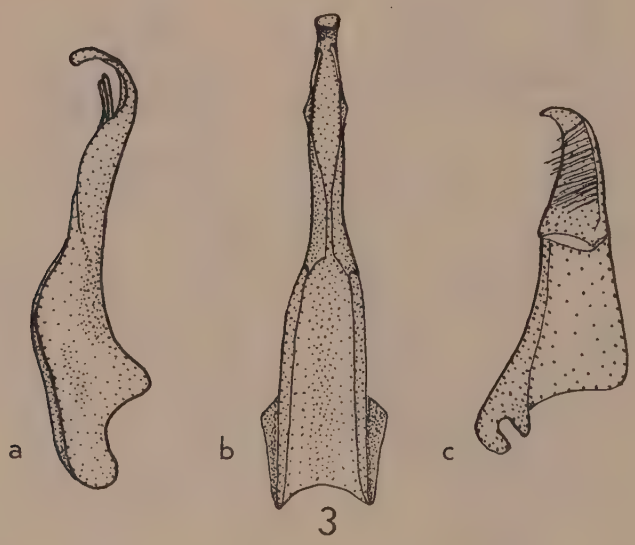


Fig. 3.—Aedeagus of *S. coriaceus*. (*a*) Median lobe, side view. (*b*) Median lobe, dorsal view. (*c*) Paramere, inside view.

and the outline of the body is much less discontinuous, although the base of the pronotum is slightly narrower than the base of the elytra. In *caraboides* the coxa lines are rather closely approximated and parallel at the base, then divergent; in *coriaceus* and *capensis* they are more widely separated and slightly divergent from the base. At present only *capensis* females are known, but the aedeagus of *coriaceus* is very different from that of *caraboides* (figs. 2 and 3). These

differences justify the placing of the two species in a genus of their own, closely allied to *Yola* on the one hand and *Tyndallhydrus* on the other. I have named the new genus *Sharphydrus* in honour of Dr. David Sharp, whose monograph on the Dytiscidae of the world is a monument of patience and industry and indispensable to all who study the group.

Sharphydrus gen. n.

Scutellum hidden; metepisterna taking part in formation of mesocoxal cavities; prosternal process not on same plane as prosternum, not depressed in front of mesocoxae but just reaching metasternal process. Metasternum without a deep, bordered groove; metacoxal cavities separated by the adpressed metacoxal processes and incised, leaving base of trochanters fully exposed; metacoxal lines reaching metasternum and slightly divergent. Upper surface coriaceous, pronotum provided with lateral incised lines; clypeus not bordered nor distinctly separated from front of head. Front and middle legs rather long, fourth tarsal segment small but exposed, claws of hind legs equal.

The genus at present contains two species, *coriaceus* Régimbart and *capensis* Omer-Cooper, of which I designate *coriaceus* Rég. as the type species.

The following table serves to differentiate the three allied genera, *Tyndallhydrus*, *Sharphydrus* and *Yola*.

A. Prosternal process not reaching the metasternal process . . . . **Tyndallhydrus** Sharp

B. Prosternal process reaching the metasternal process.

1. Upper surface coriaceous, metasternum not deeply grooved anteriorly, elytra keeled or not keeled . . . . . **Sharphydrus** gen. n.
2. Upper surface not coriaceous, metasternum with an anterior deep, bordered groove, elytra provided with keels although sometimes slight . . . . . **Yola** Des Gozis

Acknowledgment

My thanks are due to the South African Council for Scientific and Industrial Research for a grant which enables me to continue my work on the African Dytiscidae.

References

Omer-Cooper, J., 1955, *C. lateralis* Boh. and further new Dytiscidae (Coleoptera) from the Cape Province of South Africa. *Proc. R. ent. Soc. Lond.* (B) **24**: 189–96.

Régimbart, M., 1895, Dytiscidae et Gyrinidae d'Afrique, Madagascar et Iles Voisins, un contribution à la Faune Entomologique du Congo. *Mem. Soc. ent. Belg.* **4**: 1–244, figs. 1–82.

Sharp, D., 1882, Aquatic carnivorous Coleoptera or Dytiscidae. *Sci. Trans. R. Dublin Soc.* **2**: 179–1003, pls. 6–18.

A NEW SPECIES OF *EURYCOCCUS* FERRIS (HOMOPTERA: PSEUDOCOCCIDAE) FROM ISRAEL

By D. J. Williams

(*Commonwealth Institute of Entomology*)

The following species has been submitted to me for identification by Mr. M. Sternlicht of Tivon, Israel, and I am grateful to him for giving me the opportunity to study his material.

Eurycoccus sternlichti sp. n.

Adult female pink in colour and covered with a white powder.

Recognition characters.—A rather large oval species, widest on the anterior abdominal segments and attaining a length of 4 mm. Antennae eight-segmented. Legs short and stout, the hind coxa with a few translucent pores. Circulus large, appearing to lie in a depression. Ostioles well developed, each lip with 3 or 4 setae and a few trilocular pores; inner edges of lips moderately sclerotized. Anal ring with 6 setae, about as long as diameter of ring. Cerarii confined to anal lobes, these similar to others in the genus; each cerarius composed of 3 setae, only a little stouter than surrounding setae, but their presence detectable by the larger setal bases. Number of trilocular pores surrounding cerarian setae no greater than number near other setae on last segment. Dorsal surface with numerous setae, all short and slender. Dorsal multilocular disc pores and tubular ducts absent; trilocular pores abundant and evenly distributed.

Ventral surface with a pair of long, stout, apical setae, nearly twice as long as those on anal ring; ventral setae longer but not so numerous as on dorsal surface; noticeable concentrations of setae present anterior and posterior to circulus. Multilocular disc pores not numerous, confined to four posterior segments, arranged in more or less single transverse rows. Two to 4 pores present on sixth segment, 6 to 16 on seventh, 17 to 28 on eighth and 8 to 13 posterior to vulva. Tubular ducts small, on four posterior abdominal segments only; numerous in mid-region of sixth segment, a few present in a transverse group on seventh segment and groups also occur on margins of seventh and eighth segments and between anal lobes. Trilocular pores not so numerous as on dorsal surface but becoming more numerous anteriorly.

It is very difficult to make satisfactory preparations of the older females and the illustration is based on young adults.

Israel: Tivon, on *Quercus ithuburensis*, 13.ix.56, 7.x.56 (*M. Sternlicht*).

Habit.—Occurring in colonies of two to five in the hollows of the branches and causing galls up to 8 cm. long and 2–3 mm. thick. The mealybugs live in association with ants of the genus *Crematogaster*. In times of danger the ants carry the mealybugs to the nest, where colonies of up to 80 may be found.

Notes.—Ferris assigned three species to the genus *Eurycoccus* in his *Atlas of Scale Insects of North America*, 1950, **5**: 81, and a further species, *E. blanchardii* (King and Cockerell), was placed in the genus in his *Atlas*, 1953, **6**: 349. The first three species have rather stout setae, but *sternlichti* has more slender setae and in this respect bears a similarity to *blanchardii*, to which it is apparently more closely related. The new species differs from *blanchardii* in having eight-segmented antennae instead of seven, and only six anal ring setae.

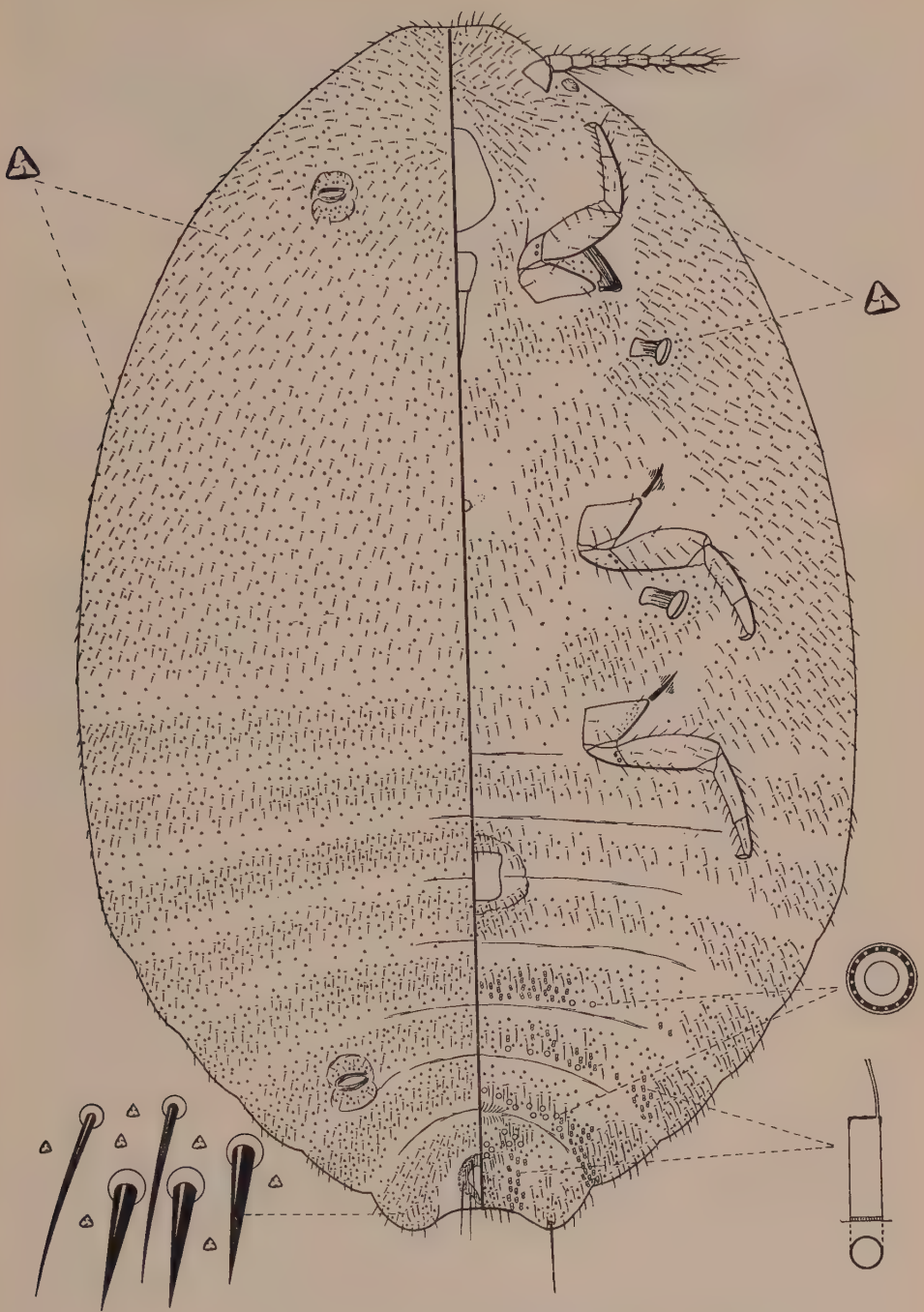


FIG. 1.—*Eurycoccus sternlichti* sp. n.

Ferris has described the anal ring in *blanchardii* as possessing four supernumerary setae. The small difference in size and shape of the cerarian setae and body setae seems to be common in most of the known species, although *blanchardii* is described as having no cerarii. In redescribing the Newstead mealybugs from the Ethiopian Region (Williams, *in press*), I have placed *Pseudococcus coccineus* Newstead, from Kilimandjaro, in the genus *Eurycoccus*. It seems possible that the genus is widespread and further species will probably be added to it when the mealybug fauna is better known.

Holotype and paratypes deposited in the British Museum (Natural History). Other paratypes returned to Mr. Sternlicht.

RHOPOMORPHUS VARLEYELLUS GEN. ET SP. N. (HYMENOPTERA : CHALCIDOIDEA : ENCYRTIDAE)

Par J. Ghesquière

(*Menton, France*)

Le Musée Zoologique de l'Université d'Oxford m'a soumis pour étude un lot de préparations microscopiques composé de spécimens du groupe *Rhopus*/*Xanthoencyrtus* récoltés en Angleterre. Parmi ceux-ci se trouvaient deux exemplaires femelles pouvant difficilement être classés dans l'un ou l'autre de ces genres. Je les considère comme les types d'un genre inédit, affin de *Doliphoceras* Mercet, 1921, mais très proche aussi de *Rhopus* Foerster, 1856 et de *Xanthoencyrtus* Ashmead, 1902.

Rhopomorphus gen. n.

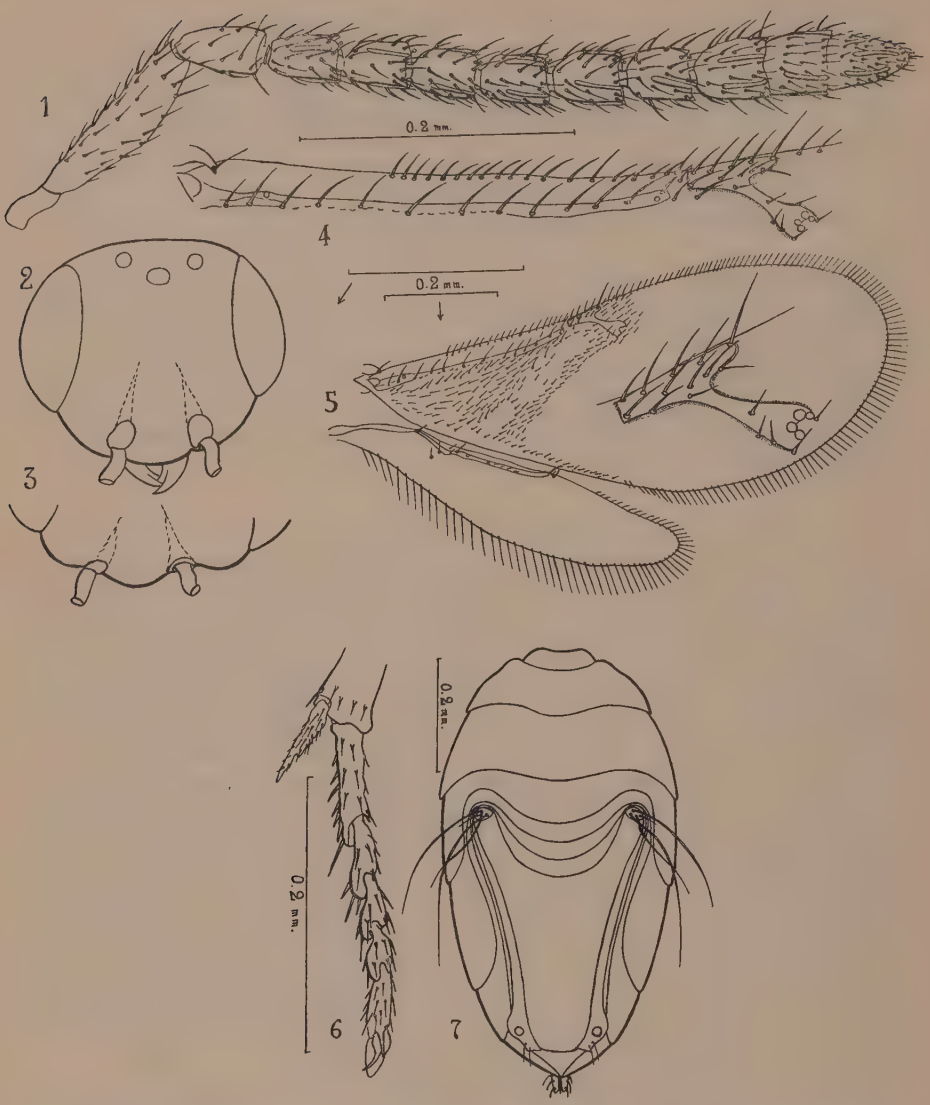
Tête vue de front un peu plus haute que large ; yeux relativement petits, subarrondis, finement pubescents ; bord de l'occiput immarginé ; front large, trilobé à la base ; face trilobée ; *antennes* de 12 articles (anneau compris), insérées en haut de la face sous la ligne interoculaire inférieure ; scape inéquilatéral, rétréci aux deux extrémités ; pédicelle obconique, plus grand que le I du funicule ; flagellum cylindroïde à funicule sexarticulé et massue biseptée ; mandibules bidentées ; palpes maxillaires triarticulés ; palpes labiaux invisibles sur les préparations. *Thorax :* pronotum court comme chez les *Rhopus*, entourant le scutum dans sa portion distale (sans toutefois atteindre les tégules) ; collare conique mésonotum à scutum plus large que long, surplombant antérieurement le pronotum ; axilles contigus ; scutellum subtriangulaire, arrondi antérieurement, largement obtus postérieurement, aussi long que le scutum. *Ailes antérieures* peu allongées, obovales, à base brusquement rétrécie, disque frangé ; submarginale presque parallèle au bord costal ; marginale plus longue que large, atteignant le bord du disque peu avant son milieu ; stigmale plus longue que la marginale mais plus courte que marginale + postmarginale ; postmarginale plus courte que la marginale ; spéculum complet. *Ailes postérieures* subelliptique-allongées. *Pattes* normales ; éperon du tibia médian plus court que le métatarse mais aussi long que la partie dorsale de celui-ci ; apex des articles tarsaux fortement oblique. *Abdomen* ovale, plaques cercales (pygostyles auct.) situées dans la portion proximale du tiers médian, au bord postérieur de l'urotergite VI (*sensu* Domenichini, 1953).

Espèce typique : *Rhopomorphus varleyellus* sp. n.

Rhopomorphus varleyellus sp. n.

♀, longueur du corps 1·2 mm. *Teinte* générale ocre-testacée faiblement luisante, sauf les tibias et les tarses plus clairs, les yeux noir-rougeâtres ; les ocelles rouges ; les nervures des ailes antérieures jaune foncé, nervures distales entourées d'un fin liseré fuligineux nettement plus large chez le paratype que chez l'holotype ; les nervures des ailes postérieures translucides. Ciliation générale brunâtre.

Tête finement chagrinée, vue de dessus transverse, vue de face un cinquième plus large que haute, un peu plus large que le thorax, à ciliation éparse, cils en général un peu plus courts que la distance qui les sépare ; yeux petits, ovale-arrondis, leur axe divergeant vers la base ; bord de l'occiput arrondi ; vertex transverse, trois fois plus large que haut ; ocelles en triangle largement équilatéral, les latéraux plus éloignés entre eux que



FIGS. 1–7.—*Rhopomorphus varleyellus* Ghesq. ♀. *Holotype :* (1–2, 4–7). (1) Antenne droite. (2) Tête vue de front, faiblement inclinée à gauche. (4) Nervation alaire. (5) Ailes antérieure et postérieure ; au centre dudisque : nervures marginale, post-marginale et stigmale fortement grossies. (6) Apex du tibia et tarses médians. (7) Abdomen, face dorsale. *Paratype :* (3) Partie basale du front.

du bord latéral des yeux ; front large mais un peu plus haut que large, partie supérieure faiblement bombée (fig. 2) ; face un peu plus large que le front (sa hauteur difficilement appréciable sur les préparations), trilobée basalement, à lobe médian séparé des latéraux par 2 sillons convergents, larges mais peu profonds, dans lesquels s'insèrent les toruli (figs. 2–3) ; gênes de longueur égale au diamètre des yeux, *mandibules* bidentées, dents aigues ; *antennes* relativement épaisses, aussi longues que la tête et le thorax réunis, ciliation comme

indiqué à la figure 1 ; pédicule deux fois plus long qu'épais ; scape subcylindrique faiblement fusoïde, rectiligne dorsalement, un peu bombé ventralement, un peu plus long que le pédicelle et le I du funicule réunis ; pédicelle obconique, deux fois plus long que sa plus grande largeur ; anneau très fin ; articles du funicule cylindriques, progressivement plus courts et plus épais de I à VI, I à peine deux fois plus long que large, VI un sixième plus long que large, sur chaque article un sensille basiconique dans la portion dorso-apicale et 3 sensilles crêtiformes ; massue elliptique, un peu plus épaisse que le VI du funicule : I un peu plus long que II, III un peu plus long que I, cloisons horizontales faiblement ondulées, 3 sensilles crêtiformes sur chaque article. *Thorax :* pronotum finement chagriné, surplombé par la portion antérieure du mésonotum, éparsément cilié ; collare conique, un peu moins long que la moitié du scutum ; mésonotum à scutum subtriangulaire, un tiers plus large que long, bord antérieur largement obtus, chagriné-réticulé, réticulation transverse penta- à hexagonale, une centaine de cils environ plus ou moins régulièrement espacés, plus longs et plus forts que ceux du pronotum, subégaux à la distance qui les sépare ; axilles finement chagriné-réticulés, réticulation peu visible, aigus, se touchant au sommet, sur chacun d'eux 10 cils semblables à ceux du scutum ; scutellum finement chagriné-réticulé, réticulation longitudinale à réseau étroitement allongé, un peu plus large que long, aussi long que le scutum, largement obtus antérieurement, triangulaire à sommet obtus dans sa portion postérieure, une soixantaine de cils épars semblables aux précédents et 4 longues soies postérieures dont les internes trois fois plus longues que les externes, au centre 2 sensilles placoïdes inégalement disposés ; métanotum très court médialement, glabre, finement chagriné, au centre des portions latérales une petite surélévation lenticulaire et striolée transversalement, cotés moitié plus courts que ceux du propodéum ; mégaphragma large, à apex obtus, atteignant la base de l'urotergite II. *Ailes antérieures* assez courtes, long. 0·942 mm. (soit environ les trois quarts de la longueur du corps), ne dépassant pas l'extrémité abdominale, ciliées sur toute leur surface, cils fins à socle large, de longueur égale à la distance qui les sépare (fig. 5) ; cellule costale étroite, glabre, bordée distalement de 18 à 20 cils robustes et courbés, plus robustes mais plus courts que les cils marginaux, sa face inférieure avec une double rangée de petits cils fins et courbés augmentant progressivement de taille à partir de la base de l'aile ; disque bordé d'une frange relativement longue, le plus long cil de 0·043 mm. ; submarginale avec 13 cils semblables à ceux du bord costal mais plus longs (fig. 4) et 2 sensilles placoïdes (1 basal et 1 apical) ; marginale trois fois plus longue que large, séparée de la submarginale par une fenêtre translucide, avec une dizaine de longs cils semblables aux précédents ; postmarginale 2·5 fois plus courte que la marginale, un long cil apical (le plus long de l'aile) ; stigmale un peu plus courte que marginale + postmarginale, s'élargissant de la base au sommet, celui-ci trois fois plus large que la base et profondément échancré à son extrémité, 4 sensilles disposés par paires sur le bord interne de cette échancrure, au centre du radius un cil médian présent sur les ailes des 2 examplaires (fig. 4) tandis que le noeud peut être glabre ou muni de 1 à 3 cils ; spéculum complet, large, coupé par une ligne transversale de cils située dans le tiers proximal, une rangée de 3 cils plus longs et plus forts que les cils du disque dans la partie distale de son bord interne. *Ailes postérieures* relativement longues (deux-tiers de l'aile antérieure), portion apicale arrondie ; une frange marginale, le plus long cil = 0·063 mm. *Pattes* grêles, articles tarsaux à apex obliquement évasé et garnis inférieurement de 2 rangées d'épines robustes ; V caractérisé par un long pulvillus apical dépassant les ongles et deux fois plus épais que ceux-ci (fig. 6). *Propodéum* (urotergite I) faiblement chagriné, glabre dorsalement, bords externes à pubescence longue et couchée, portion médiane raccourcie ou trois fois plus courte que les cotés et limitée par deux crêtes divergentes, stigmates grands et arrondis. *Abdomen* (gaster auct.) plus long que la tête et le thorax réunis, un peu plus large que le thorax, ovale, éparsément cilié sur toute sa surface dorsale, cils plus fins et plus longs que ceux du scutum ; urotergites finement chagriné-réticulés transversalement sur toute leur surface sauf le III striolé-réticulé, II un tiers plus court que III, IV le plus long, deux fois plus long que III et que V, V fortement ondulé à cotés dépassant longuement les plaques cercales, VI-VII-VIII contournant étroitement les plaques cercales comme indiqué figure 7, VIII avec un stigma apical et 2 longs cils

sous celui-ci, les plus longs de l'abdomen, IX et X chagrinés, glabres sauf sur les cotés une vingtaine de cils disposés par paires, plats, en forme de Y dont le sommet des branches porte les plaques cercales, sur celles-ci sont fixées 4 vibrisses : 2 longues, 1 moyenne et 1 courte ; tarière peu proéminente insérée au milieu de la face ventrale.

♂ inconnu.

Holotype ♀, Grande-Bretagne : Bristol, Hallen Wood, Glos., 7.viii.1927; paratype ♀, même localité, 18.vii.1928. Déposés au Muséum de l'Université d'Oxford sous le n° 21063 (*ex* coll. Blood).

Le paratype est de taille plus grande que l'holotype (longueur du corps, 1·55 mm., ailes 1·1 mm.). Pareilles différences, parfois plus importantes encore, se présentent dans plusieurs groupes d'Encyrtides et de Pteromalides, principalement parmi les parasites de Cochenilles.

Biologie inconnue.

Cette espèce nouvelle est dédiée à mon collègue G. C. Varley, Professeur de Zoologie à l'Université d'Oxford, à l'amabilité duquel je dois d'avoir pu étudier cet intéressant matériel.

Affinités.—Le genre *Rhopomorphus* Ghesq. appartient à la tribu des Ectromini Ashmead, 1900 (*s.l.*), ou des Leptomastidini Erdös et Novicky, 1955 (*s. str.*), soustribu des Rhopina Erd. et Nov. Par la conformation générale de son corps, il est, comme dit plus haut, voisin du genre *Rhopus* Foerst., mais la chétotaxie des antennes, les proportions des articles du flagellum et de la nervation alaire, l'éloignent de ce groupe, pour le rapprocher du genre monobasique *Doliphoceras* Merc., dont j'ai pu voir et dessiner en détail l'espèce type, grâce à l'obligeance du Dr. G. Ceballos, Directeur de l'Institut espagnol d'Entomologie à Madrid. Outre sa teinte noir de poix, cet espèce type, *D. integralis* Merc., se différencie de *Rh. varleyellus* Ghesq. par sa face faiblement et uniformément convexe, son pédicelle plus court que le I du funicule, ses ailes antérieures à base étroite et à sommet dépassant l'apex de l'abdomen, sa marginale aboutissant au-delà du milieu du bord antérieur du disque dont la frange est extrêmement courte, son abdomen longuement triangulaire à plaques cercales situées au bord postérieur de l'urotergite III, tous caractères qui rattachent le genre *Doliphoceras* Merc. à la sous-tribu des Anusiina Erd. et Nov., tandis que ces deux derniers auteurs le range dans la sous-tribu des Rhopina, entre les genres *Rhopus* Foerst. et *Platyrhopus* Erd., 1955. *Doliphoceras* me semble mieux à sa place en tête de la sous-tribu des Anusiina, la liaison entre les deux sous-tribus étant établie par le genre *Rhopomorphus* Ghesq.

Cette sous-tribu des Rhopina comprendra les genres *Rhopus* Foerst., *Xanthoencyrtus* Ashm. et *Rhopomorphus* Ghesq. J'en détacherai le genre *Platyrhopus* Erd. qui représente une sous-tribu nouvelle, Platyrhopina **nov.,** dont fait également partie le genre *Ferrièreus* Ghesq., 1956.

Summary

A detailed diagnosis and description are given of *Rhopomorphus varleyellus* gen. et sp. n. discovered in England in 1927, with a discussion of the tribal affinities of the genus. The biology of the new species is unknown.

References

Ashmead, W., 1900, On the genera of the Chalcid-flies belonging to the subfamily Encyrtinae. *Proc. U.S. nat. Mus.* **22** : 327.

—— 1902, The Hymenopterous parasites of *Phenacoccus cavalliae* Ckll. *Canad. Ent.* **34** : 302 (sub 1902, *Proc. Wash. Acad. Sci.* **4** : 302, *laps. script.* in *Zool. Rec.* 1902).

Domenichini, G., 1953, Studio sulla morfologia dell'addome degli Hymenoptera Chalcidoidea. *Ann. Fac. Agrar. Milan* **2** : 203–6, fig. 13.

Erdös, J., 1955, Megfigyelések a nád kártevöoiröl és azok parazitáiról. (Observationes de insectis nocivis eorumque parasitis in *Phragmite vulgari* Lam.). *Állat. Közlem.*, Budapest, **45** : 40, 47, figs. 5[b], 6.

—— and Novicky, S., 1955, Genera Encyrtidarum regionis palaearticae. *Beitr. Ent.* **5** : 166.

Foerster, A., 1856, *Hymenopterologische Studien.* **2**, *Chalcidiae et Proctotrupii* : 34, 37. Aachen.

Ghesquière, J., 1956, Remarques taxonomiques et biologiques sur quelques Encyrtides (Hym. Chalcidoidea). *Boll. Lab. Zool. Portici* **38** : 683, 695, 698.

Mercet, R., 1921, *Fauna Iberica, Hymenopteros Familia Encirtidos* : 91, figs. 14, 15, 16, Madrid (Mus. Cienc. Nat.).

AN *ABACETUS* (COLEOPTERA: CARABIDAE) FEEDING IN LOCUST EGG-PODS

By S. L. Straneo
(*Gallarate, Italy*)

Mr. E. B. Britton of the British Museum (Nat. Hist.) was good enough to send to me for study some examples of an unnamed Carabid belonging to the genus *Abacetus*. The specimens had been bred from larvae found feeding in locust egg-pods in the flood plain of the Middle Niger, French Sudan, by Mr. G. B. Popov.

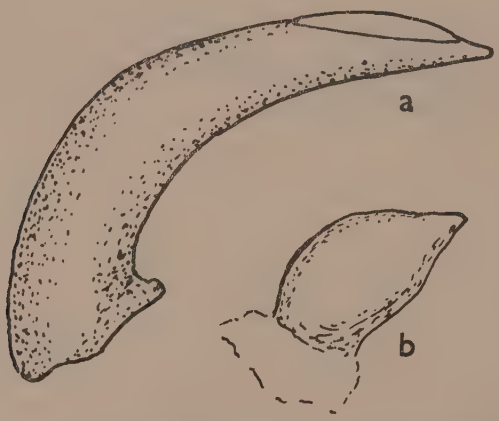


Fig. 1.—*Abacetus dainellii* Straneo. (Stanleyville, Yangambi). Aedeagus: (*a*) lateral view, (*b*) left paramere.

When I received these *Abacetus* I saw at once that they belonged to a species previously considered very rare, viz. *Abacetus dainellii* Straneo (1940, *Boll. Soc. ent. Ital.* **72**: 40), of which the examples collected by Mr. Popov represent a well characterised race.

When I described *A. dainellii*, it was the first species of the genus *Abacetus* bearing *two* impressed punctures on the third interstice of the elytra. Later I described *A. burgeoni* (1949, *Rev. Zool. Bot. afr.* **42**: 151) with *three* impressed punctures on the third interstice. Among the many hundreds of species of the genus *Abacetus*, *dainellii* and *burgeoni* are still the only two known having more than a single puncture on the third interstice.

All the male examples examined of *A. dainellii* have a characteristic form of aedeagus (fig. 1*a*); it is rather stumpy, slightly curved, with the apical blade simply curved and very short; the left paramere, instead of being rounded as in other species of the genus, is angulate (fig. 1*b*). This species also shows a slight secondary sexual character, the eyes being strongly convex in male specimens and distinctly less so in the females.

I give below some notes on the examples of *A. dainellii* which I have examined since 1942.

The holotype male, allotype female (in Museo Civico di Storia naturale, Genova) and a single paratype male (in my collection) were collected at Gorgorà, on the shore of Lake Tana (Ethiopia) by Prof. G. Dainelli. The base of the prothorax is only slightly or very slightly punctate.

A specimen from Nanoropus, Bords du Lac Rodolphe, 565 m. (Miss. Sci. Omo, Arambourg, *Chappuis and Jeannel*) is very similar to the type; the colour of the upper surface only is a little greener.

A single male in my collection from Deutsch Südwest Africa, Caprivizipfel, is strongly punctate on the base of the prothorax; the sides of the prothorax are more strongly sinuate; the aedeagus is normal, but bears an irregular swelling on the ventral face at about one quarter the distance from the apex (possibly an individual malformation); the elytra are distinctly longer. I think this example represents a valid race but I prefer to defer naming it until more specimens are available.

There are, in addition, some examples from the Belgian Congo. The first of these was presented to me by the late L. Burgeon, under the name of *Abacetus occidentalis* Tschitscherine, but it does not agree with that species. It is labelled "Katanga, Kakyelo, 7/9.xi.1930, G. F. De Witte", and is an immature female. I wrote on the label "*non corrisponde alla descrizione*"; to-day I recognise it as *Abacetus dainellii*.

Recently I received from my friend P. Basilewsky, the well-known specialist in African Carabidae, three specimens from the Belgian Congo. A male from Stanleyville, Yangambi (14/15.xii.1952, *P. Basilewsky*) is very similar to the typical form; the base of the prothorax is nearly smooth. A female from the same locality is considerably larger; the elytra, as in the females of this species, are considerably sericeous. Another male from Kivu, Uvira, Marais de la Ruzizi, 776 m. (x.1953, *N. Leleup*) is very similar to the male from Yangambi, but the base of the prothorax is rather strongly punctate. There is also a female from Ubangi, Bumba (11.xii.1952, *P. Basilewsky*), rather large, but not so large as the female from Yangambi; the prothorax is larger than in the typical form.

Finally there is in my collection a single example from French Niger; it is smaller than the typical form, with the base of the prothorax nearly smooth.

The seven specimens sent by Mr. E. B. Britton are very similar to that from French Niger. They are all very recently emerged and rather immature; the underside and the legs are therefore yellow. It is impossible to study the aedeagus because it is not at all chitinised. The seven examples are, however, all very similar; they differ from the typical form in the shape of the prothorax, which is more constricted anteriorly and therefore seems wider; the base is nearly entirely smooth, in every case less punctate than in every other known example.

The following are the measurements of the specimen I have selected as type (in the British Museum (Nat. Hist.)): length 6·2 mm.; width 2·40 mm.; prothorax—length 1·45 mm., max. width 1·85 mm., anterior width 0·95 mm., basal width 1·35 mm.; elytra—length 3·85 mm.; width 2·40 mm. I think that this form is a valid race, to which also the example from French Niger must be referred, and I give to it the name var. **popovi** var. nov., dedicating it to its collector.

The holotype ♂ and four paratypes are in the British Museum (Nat. Hist.); the allotype ♀ and a paratype ♂ are in my collection.

It will be interesting to know if *Abacetus dainellii*, in the larval stage, is only a predator of locust egg-pods, or if it lives inside them as a true parasite. Though the larval cycle of *A. dainellii* is not known, I think that it is much longer than the locust cycle; so that this last hypothesis is probably erroneous.

Book Notices

Bulletin of the California Insect Survey. Vol. 6, no. 1. *The typical Muscid flies of California.* By Bruce F. Eldridge and Maurice T. James. Pp. 17, illust. Vol. 6, no. 2. *The Conopid flies of California.* By Sidney Camras and Paul D. Hurd, Jr. Pp. 19–49, illust. Vol. 6, no. 3. *The Embioptera of California.* By Edward S. Ross. Pp. 51–57, illust. 8vo. Berkeley and Los Angeles (University of California Press), 1957. Price $0.50, $0.75, $0.50.

These three works comprise the latest additions to the *Bulletin of the California Insect Survey* and are designed to permit the identification and show the distribution of the groups with which they deal.

In each case the species found in California are keyed, with synonymy, collection data and notes on their biology.

The standard of illustration is high and distribution maps are included in the parts dealing with Muscidae and Conopidae. A comprehensive bibliography is included at the end of each part.

Insects of Hawaii. Vol. 6. *Ephemeroptera-Neuroptera-Trichoptera* and Supplt. Vols. 1–5. By Elwood C. Zimmerman. 8vo. Honolulu (University of Hawaii Press), 1957. Pp. ix + 209, text illust. Price $4.50.

This latest addition to the *Insects of Hawaii* series deals with the Ephemeroptera, Neuroptera and Trichoptera and follows the pattern of previous volumes.

Information is included on 58 species and subspecies in 12 genera as follows: 1 immigrant mayfly (Ephemeroptera), 1 immigrant caddisfly (Trichoptera), and 7 immigrant and 49 endemic Neuroptera, with a summary of the nomenclatorial changes made.

The volume also includes on pages 177–201 a Supplement listing additions and corrections to the first five volumes.

REVISION OF THE GENUS *EYPREPOCNEMIS* FIEBER, 1853 (*ORTHOPTERA: ACRIDOIDEA*)

By V. M. Dirsh

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Introduction

The name of the genus when it was first described by Fieber in 1853, was spelt *Eyprepocnemis*. Stål in 1873 emended the spelling to *Euprepocnemis*, since when this spelling has been generally used. The original spelling, however, has priority (Uvarov, 1943, *Proc. linn. Soc. Lond.* **1942–43**).

The genus was established by Fieber for *Gryllus plorans* Charpentier, 1825, which Kirby (1910)[1] designated as the type-species of the genus, listing 18 species under it. In 1921 Uvarov revised the genus, removed some of the species into other genera and described several new ones; he listed altogether ten species. In Johnston's *Catalogue of African Grasshoppers* (1956) 14 species from Africa alone are included in the genus.

In this revision, after more exact definition of the genus *Eyprepocnemis*, two species, *E. shirakii* I. Bolivar, 1915, and *E. yunkweiensis* Chang, 1937, are removed from it to a new genus (to be published elsewhere). *E. phronusa* Brancsik, 1893, is also removed from the genus, since it has a male cercus with broadened, compressed and rounded apex, which is characteristic for *Heteracris*, but not for *Eyprepocnemis*; it becomes *Heteracris phronusa* (Bran.) **comb. nov.** One new species is described below and several old ones synonymised. As a result, 19 species and four subspecies now remain in the genus.

The majority of the species in the genus are not very sharply separated and in some cases the geographical criterion is very useful. For example, it is sometimes difficult to separate specimens of *E. kalkudensis* (Ceylon) from those of *E. smaragdipes* (Madagascar), unless their origin is known or determined specimens are available for direct comparison. The same difficulties may arise with short-winged African mountain species.

Almost all the types were studied and directly compared, except types of *E. plorans*, *E. calceata* and *E. alacris*, which are lost, and *E. montana* and *E. chloropus*, which were not available.

The vast material of the genus which was studied consisted of the material of the British Museum (Natural History) and the Belgian Congo Museum (Tervuren).

The abbreviations of names of the museums where the types are preserved are as follows:

Brit. Mus. = British Museum (Natural History), London.
Berlin Mus. = Zoologisches Museum der Universität, Berlin.
Leningrad Mus. = Zoological Institute of U.S.S.R. Academy of Sciences, Leningrad.
Madrid Mus. = Instituto Español de Entomologia, Madrid.
Paris Mus. = Muséum National d'Histoire Naturelle, Paris.
Turin Mus. = Instituto di Zoologia della Universita di Torino, Turin.
Copenhagen Mus. = University Museum, Copenhagen.
Stockholm Mus. = Naturhistoriska Riksmuseet, Stockholm.

[1] *Synonomic catalogue of Orthoptera.* Vol. 3.

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I am also very grateful to Dr. B. P. Uvarov for his advice on taxonomic matters.

GENUS *Eyprepocnemis* FIEBER, 1853

Type-species: *Gryllus plorans* Charpentier, 1825.

Of medium size. Antenna filiform. Fastigium of vertex short, slightly concave, with broadly parabolic apex. Frontal ridge flat; sometimes with shallow concavity at ocellus. Pronotum above flat, with weak lateral carinae; median carina linear. Prosternal tubercle

FIGS. 1–16.—*Eyprepocnemis* Fieber. Epiphalli: (1) *plorans* (Charp.). (2) *calceata* (Serv.). (3) *alacris* (Serv.). (4) *smaragdipes* Bruner. (5) *kalkudensis* Henry. (6) *noxia* Dirsh. (7) *rosea* Uv. (8) *cyanescens* Uv. (9) *hokutensis* Shir. (10) *unicolor* Tarb. (11) *burmana* Rme. (12) *abyssinica* Uv. (13) *montigena* Johnst. (14) *burtti* sp. n. (15) *keniensis* Johnst. (16) *javana* Will.

cylindrical, slightly curved backwards, with rounded, sometimes slightly inflated apex. Mesosternal interspace elongated; mesosternal lobe rounded. External apical spine of hind tibia absent. Supra-anal plate simple, elongate-triangular. Male subgenital plate subconical, short; male cercus moderately broad at the base, gradually narrowing towards apex, incurved and slightly decurved, with apex acute or subacute, often oblique at the

upper apical edge. Female subgenital plate trilobate. Ovipositor simple, with valves moderately curved.

Epiphalli (figs. 1–16) rather uniform throughout the whole genus, differing only in secondary characters, such as the shape of the lophi and the angle at which they are attached to the bridge. When comparing the figures with the actual epiphalli, it should be remembered that they might be drawn under different angles; in this paper all are drawn with the lophi in approximately horizontal position.

The genus *Eyprepocnemis* belongs to the group Eyprepocnemidini, which is widely distributed in the warmer parts of the eastern hemisphere. The genus *Eyprepocnemis* itself is distributed throughout Africa, Mediterranean coasts of Europe, the whole of Southern Asia, and parts of the Malayan archipelago.

Key to Species

1 (24) Elytron and wing fully developed or only slightly shortened.
2 (21) Pronotum above with a characteristic dark spot (fig. 17). Elytron mostly with dark spots.
3 (18) Wing colourless.
4 (15) Lateral carinae of pronotum converging forwards; prozona about as long as metazona (sometimes slightly longer or slightly shorter).
5 (14) Concavity of fastigium of vertex distinct, with a low apical carinula, separating it from frontal ridge. Spot on dorsum of pronotum narrow.
6 (13) Concavity of fastigium of vertex with apex parabolic.
7 (12) Lower side of hind femur same coloration as abdomen.
8 (9) Basal half of hind tibia blue, apical half red . **plorans** (Charpentier)
9 (8) Whole hind tibia blue, or grey, or olive-grey except the tip, which is reddish.
10 (11) Hind tibia blue, only its tip red . . . . . **calceata** (Serville)
11 (10) Hind tibia grey, or olive-grey, sometimes with reddish tip **alacris** (Serville)
12 (7) Lower side of hind femur reddish-orange . . . **kalkudensis** Henry
13 (6) Concavity of fastigium of vertex with slightly angular apex **smaragdipes** Brancsik
14 (5) Concavity of fastigium of vertex indistinct, without apical carinula, not separated from frontal ridge. Spot on dorsum of pronotum wide . . . . . **noxia** Dirsh
15 (4) Lateral carinae of pronotum parallel; prozona much longer than metazona.
16 (17) Large, male 28–33, female 43–49 mm. Elytron not reaching end of abdomen, narrowed in apical third. Fastigium of vertex broader . . . . . **hokutensis** Shiraki
17 (16) Small, male 18, female 26 mm. Elytron exceeds end of abdomen, not narrowed in apical third. Fastigium of vertex narrow **javana** Willemse
18 (3) Wing pinkish or blue.
19 (20) Wing pinkish; hind tibia red . . . . . **rosea** Uvarov
20 (19) Wing and hind tibia blue . . . . . **cyanescens** Uvarov
21 (2) Pronotum and elytron uniformly coloured.
22 (23) Elytron exceeds apex of abdomen and hind knee, not narrowed in apical part. Arolium as long as a claw . . **unicolor** Tarbinsky
23 (22) Elytron not reaching apex of abdomen and hind knee, narrowed in apical part. Arolium longer than a claw . . . **olivacea** Ramme

24 (1) Elytron and wing shortened, not, or scarcely, reaching seventh abdominal tergite.
25 (32) Prosternal tubercle narrow cylindrical or subcylindrical.
26 (27) Hind tibia red except a yellowish and a brown ring at the base **burmana** Ramme
27 (26) Basal half of tibia blue or bluish with 2 whitish rings at the base ; apical half red or reddish.
28 (29) Lateral lobe of pronotum with a large black spot, which includes a light-ochraceous callosity . . . . . **brachyptera** Bruner
29 (28) Lateral lobe of pronotum without a black spot or with small one, which does not include a light callosity.
30 (31) Elytron reaching middle of abdomen . . . . **abyssinica** Uvarov
31 (30) Elytron reaching seventh abdominal tergite . . **montana** Chopard
32 (25) Prosternal tubercle inflated at apex.
33 (36) Basal half of hind tibia blue, apical half red.
34 (35) Small. Elytron not reaching middle of abdomen, with dense reticulation and thick membrane. Spot on dorsum of pronotum comparatively narrow . . . . . **montigena** Johnston
35 (34) Large. Elytron exceeds middle of abdomen, with sparse reticulation and thin membrane. Spot on dorsum of pronotum wide . . . . . **burtti** sp. n.
36 (33) Whole tibia blue, except 2 whitish rings at base . **keniensis** Johnston

1. *Eyprepocnemis plorans* (Charpentier, 1825). (Figs. 1, 17–27)

1825, *Gryllus plorans* Charpentier, *Hor. Ent.* : 134. "Lusitania." Type lost.

When studying a very large series of *E. plorans* from the whole of its area, it was found that the species varies greatly in all essential characters. On the other hand, the characters of the tropical African species, *E. ornatipes* (Walk.) (syn. *senegalensis* I. Bol.), *E. meridionalis* Uv. (syn. *capitatus* Mill.) and *E. ibandana* G.-T., also proved to be unstable and broadly overlapping with characters of *E. plorans*, as well as between themselves (see table of measurements and ratios). This suggested that they belong to the same species, which may be divided into several not sharply differentiated subspecies.

The following characters and ratios, which appeared to be essential, have been studied :

(*a*) *Body size.*—In extreme cases, it is smallest in *ibandana*, largest in *ornatipes* and intermediate in *plorans* and *meridionalis*, but even the smallest and the largest subspecies overlap widely.

(*b*) *Length of elytron* (E).—The absolute length of the elytron is smallest in *ibandana* and largest in *ornatipes*. However the relative length, estimated as a ratio of the length of the elytron to that of the pronotum (E/P), is smallest in *meridionalis* and largest in *ornatipes*, but both the absolute measurements and ratios are so widely overlapping that it is not possible to use them as characters of specific value ; even the subspecies might be discriminated by this character only in their extreme forms.

(*c*) *Length of pronotum* (P).—This measurement again is smallest in *ibandana* and largest in *ornatipes*. It follows that the size of the body and its measurements widely overlap in all four subspecies.

(*d*) *Maximal width of head* (C).—In absolute measurements the maximal width of the head is smallest in *ibandana* and largest in *ornatipes*. Considering

the relative width of the head as the ratio of the length of pronotum (P) to the width of head (C), *meridionalis* has the widest head and *ibandana* the narrowest but both are very widely overlapping between themselves and with two other subspecies.

(*e*) *Length of hind femur* (F1).—The smallest subspecies, *ibandana*, has the shortest hind femur and the longest is found in the largest subspecies, *ornatipes*. The same is true for its relative length as shown by the F1/P ratio, but in both respects there is a wide overlap between them, *meridionalis* and *plorans*.

(*f*) *Width of hind femur* (Fw).—In absolute measurements *ibandana* has the narrowest femur and *meridionalis* the widest. The relative width, taken as F1/Fw ratio shows the same arrangement, but both the absolute measurements and the ratios overlap between all four subspecies.

(*g*) *Prosternal tubercle*.—The prosternal tubercle varies in all subspecies from narrow cylindrical with rounded apex to thick cylindrical with the apex slightly inflated. The first extreme form occurs mainly in the small sized *ibandana*, the second one is found in *meridionalis* in its extreme forms, but occurs also in the large sized *plorans* and *ornatipes*.

(*h*) *Form of fastigium of vertex*.—In all four subspecies, the smallest specimens have a tendency towards a relatively narrower apex of the fastigium.

(*i*) *Coloration and pattern*.—As a general tendency, *ornatipes* is of paler colour, with less developed spots and with a clear whitish stripe in the costal area of the elytron. The darkest colour is found, in general, in *ibandana*, with the dark spots and the whitish stripe on the elytron often disappearing; *plorans* occupies an intermediate position with better developed spots and with a clear white stripe on the elytra. In *meridionalis* general coloration varies from very light to very dark, with spots on the elytron and with a white stripe in the costal area. However, the shade of general coloration probably depends greatly on the environment. It was observed that the populations living in places with burnt grass are dark, sometimes blackish, while those in fresh or dry grass are of more usual ochraceous colour. This fact is known for many other species of Acridoidea.

The form of the dark spot on the pronotum, which is most characteristic for the majority of species of this genus, varies slightly in its width in every subspecies.

(*j*) *Phallic complex*.—These structures, including epiphallus, are identical in all four subspecies. A study of series from the same locality and from different localities shows only small individual variability.

When large series of the four subspecies were studied, it was found that specimens and even populations taken near the borders of their areas were often difficult to refer to a definite subspecies. It is possible that a statistical analysis may help in this respect.

Key to Subspecies of *E. plorans*

1 (6) Elytron usually reaching or exceeding the hind knee. P/C ratio 0·98–1·42.

2 (5) Whitish stripe in costal area of elytron usually present.

3 (4) Smaller, with relatively shorter elytron. E/P ratio 3·46–4·87
plorans (Charpentier)

4 (3) Larger, with relatively longer elytron. E/P 3·97–4·94
ornatipes (Walker)

5 (2) Whitish stripe in costal area of elytron usually absent
ibandana Giglio-Tos

6 (1) Elytron usually not reaching the hind knee. P/C ratio 0·96–1·29
meridionalis Uvarov

TABLE I.—*Range of variability in measurements and ratios in the subspecies of* E. plorans

Indices and ratios	Sex	*plorans*	*ornatipes*	*meridionalis*	*ibandana*
L, length of body	♂	22·0–32·9	25·8–33·7	20·9–29·8	18·8–30·3
	♀	33·0–48·9	36·0–49·8	27·2–45·2	27·1–45·5
E, length of elytron	♂	16·7–29·1	23·3–31·5	14·3–29·8	13·5–24·0
	♀	23·9–38·5	29·6–40·0	17·4–36·9	18·1–33·3
P, length of pronotum	♂	5·4–7·2	5·1–7·0	4·3–6·3	4·0–5·9
	♀	6·4–9·1	6·8–8·6	5·3–7·5	5·4–7·7
C, maximal width of head	♂	3·9–5·1	3·9–5·3	3·5–5·4	3·2–5·0
	♀	5·3–7·2	5·3–7·3	5·0–7·0	4·6–7·0
Fl, length of hind femur	♂	14·1–20·0	15·1–19·7	13·7–18·9	11·9–18·8
	♀	19·1–28·8	20·4–26·7	19·4–25·7	16·0–26·1
Fw, width of hind femur	♂	3·0–4·9	3·1–4·6	3·3–5·0	3·0–4·6
	♀	4·2–6·2	4·2–6·0	4·5–6·1	3·7–6·1
E/P ratio	♂	3·54–4·55	3·95–5·05	3·14–4·62	2·93–4·80
	♀	3·46–4·87	3·97–4·94	3·14–4·76	2·93–4·80
P/C ratio	♂	1·17–1·47	1·06–1·41	1·02–1·38	1·07–1·49
	♀	0·98–1·40	1·07–1·42	0·96–1·29	0·96–1·36
Fl/P ratio	♂	2·63–3·17	2·65–3·20	2·94–3·46	2·63–3·48
	♀	2·81–3·41	2·80–3·26	3·00–3·76	2·81–3·69
Fl/Fw ratio	♂	3·96–5·53	3·78–5·77	3·34–4·79	3·65–4·61
	♀	3·95–4·78	4·16–5·24	3·53–4·75	3·50–4·80

1a. *Eyprepocnemis plorans plorans* (Charpentier, 1825)

1825, *Gryllus plorans* Charpentier, *Hor. Ent.* : 134. "Lusitania." Type lost.
1839, *Acridium reticulatum* Fischer-Waldheim, *Bull. Soc. Nat. Mosc.* **12** : 301. "Steppes de la mer Caspienne." Type lost.
1846, *Calliptamus tarsius* Fischer-Waldheim, *Orth. Imp. Ross.* : 241. "Caucasus." Type lost.

The subspecies is highly variable (see Table I and discussion of the characters on the previous pages).

Geographical distribution.—Whole Mediterranean region ; Caucasus, including the south-eastern part of North Caucasus ; Turkey ; Turkmenistan ; Persia ; south-western Arabia (forms transient to *ornatipes*).

1b. *Eyprepocnemis plorans ornatipes* (Walker, 1870)

1870, *Cyrtacanthacris ornatipes* Walker, *Cat. Derm. Salt. Brit. Mus.* **3** : 575. Type ♀. No locality. Brit. Mus.
1870, *Heteracris consobrina* Walker, *l.c.* **4** : 673, 674. Type ♀. No locality. Brit. Mus.
1914, *Euprepocnemis plorans* var. *senegalensis* I. Bolivar, *Trab. Mus. Madr.* **20** : 10. Type ♀. " Senegal." Madrid Mus. **(syn. nov.)**
1921, *Euprepocnemis plorans pallida* Uvarov, *Trans. ent. Soc. Lond.* **1921** : 111. Type ♂. " White Nile, Lake No." Brit. Mus. **(syn. nov.)**

The subspecies *ornatipes* differs from the typical one in the larger size of the body, relatively longer elytra and lighter general coloration.

The average form of the subspecies is represented by *ornatipes* and *consobrina*. Var. *senegalensis*, which was recently regarded as a species, represents a more extreme form of the subspecies, with longer elytra ; *pallida* approaches *plorans* in body size and length of elytra, but with ratios nearer to those of *ornatipes*.

Subsp. *ornatipes* is distributed in a narrow belt across the whole African continent north of the equator. On the borders of its area the subspecies is represented by intermediate forms, which in the south-west are transitional to *ibandana*, in the north-east to *plorans* and in south-east to *meridionalis*. Samples from S. Western Arabia sometimes include all intermediate forms from *ornatipes* to *plorans*.

Geographical distribution.—Senegal ; French Sudan ; N. Nigeria ; Chad Territory ; N. Cameroons ; Sudan ; Kenya (typical form) ; Eritrea ; Ethiopia ; Somaliland ; SW. Arabia (forms transient to *plorans*).

1c. *Eyprepocnemis plorans meridionalis* Uvarov, 1921

1921, *Euprepocnemis plorans meridionalis* Uvarov, *Trans. ent. Soc. Lond.* **1921** : 112. Type ♀. " Blomfontein, Orange Free State." Brit. Mus.
1929, *Euprepocnemis capitatus* Miller, *Trans. ent. Soc. Lond.* **1929** : 95, Pl. 9, f. 36. Type ♂. " Nyegezi, Tanganyika." Brit. Mus.

This subspecies, in its extreme form, differs from the typical one in the larger head, shorter elytra which do not reach the hind knee, basally slightly thickened hind femur and thicker prosternal tubercle, slightly inflated at the apex.

A study of representative series from the whole area showed that all these characters are not stable. The most extreme form is that represented by a series from Nyegezi, in which *E. capitata* Mill. was found ; it was, probably, a single population. Very numerous specimens from Lake Rukwa, N. Rhodesia and the Orange Free State (type locality of *meridionalis*) exhibit the characters mentioned less clearly.

Geographical distribution.—Kenya ; Somalia ; Tanganyika ; Nyasaland ; N. Rhodesia ; Zululand ; Orange Free State. The specimens from Somalia and some of the Kenya ones are intermediate, approaching *plorans*.

1d. *Eyprepocnemis plorans ibandana* Giglio-Tos, 1907

1907, *Euprepocnemis ibandana* Giglio-Tos, *Boll. Mus. Zool. Anat. comp. Torino* **22** : 547 : 30. Type ♂. " Lake Mweru." Turin Mus.
1921, *Euprepocnemis ibandana* var. *nigromaculata* Uvarov, *Trans. ent. Soc. Lond.* **1921** : 114. Type ♀. " Entebbe, Uganda.". . Brit. Mus. **(syn. nov.)**.
1921, *Euprepocnemis ibandana longipennis* Uvarov, *l.c.* : 114. Type ♂. " Sierra Leone." Brit. Mus. **(syn. nov.)**.

This subspecies differs from the typical one in its smaller size, thinner prosternal tubercle and the absence of a whitish stripe in the costal area of the elytron. All these characters vary greatly and there are all intermediate forms with the other subspecies.

Var. *nigromaculata* represents an individual variation with dark coloured body and elytra. Subsp. *longipennis* Uv. represents a form intermediate between *ibandana* and *ornatipes* in the length of elytra.

Geographical distribution.—Sierra Leone ; Gold Coast ; Southern Nigeria ; Cameroons ; Belgian Congo ; Western Uganda ; Southern Sudan ; Islands Fernando Po and Sao Tome.

2. *Eyprepocnemis calceata* (Serville, 1838). (Fig. 2)

1838, *Acridium calceatum* Serville, *Hist. Nat. Ins., Orth.* : 683. Types ♂♀, " Cape of Good Hope." (Lost). *Neotype* ♂. Cape Peninsula, Rondbosh, Wynberg Hill. Brit. Mus.
1870, *Heteracris annulifera* Walker, *Cat. Derm. Salt. Brit. Mus.* **4** : 656–9. Type ♀, Cape of Good Hope. Brit. Mus.

The species was redescribed by Uvarov (1921). It differs from *E. plorans ibandana* G.-T., the only subspecies with which it might be confused, in its smaller size ; the hind tibia being entirely blue, except for the whitish rings at the base and reddish spot at the apex, and in the more acute male cercus. It differs very clearly from all species of the genus in the shape of the epiphallus (fig. 2).

Geographical distribution.—South Africa ; S. and N. Rhodesia.

3. *Eyprepocnemis alacris* (Serville, 1839). (Fig. 3)

1839, *Acridium alacre* Serville, *Hist. Nat. Ins. Orth.* : 682. " Indes orientales." Type lost. *Neotype* ♂. Nadungayam, Malabar, S. India. Brit. Mus.

After studying the species from the whole of its area and other neighbouring species of the area, it appears that they represent one species, which may be divided into two subspecies.

3a. *Eyprepocnemis alacris alacris* (Serville, 1839)

1839, *Acridium alacre* Serville, *Hist. Nat. Ins. Orth.* : 682. " Indes orientales " Type lost. *Neotype*, see above.
1859, *Acridium deponens* Walker, *Ann. Mag. nat. Hist.* (3) **4** : 222. Type ♀. " Ceylon." Brit. Mus.
1870, *Heteracris rudis* Walker, *Cat. Derm. Salt. Brit. Mus.* **4** : 662, 664. Type ♀. " N. Hindostan " in description, " Ceylon " on the label. Brit. Mus.
1870, *Caloptenus reductus* Walker, *l.c.* **4** : 713. Type ♂. No locality. Brit. Mus. **(syn. nov.)**.
1871, *Acridium scitulum* Walker, *l.c.* **5** : 62. Type ♀. No locality. Brit. Mus.
1902, *Euprepocnemis plorans* var. *intermedia* I. Bolivar, *Ann. Soc. ent. Fr.* **70** : 650. Type ♂. " Madura," India. Madrid Mus.

The only new synonym is *Caloptenus reductus* Walker, 1870, which is merely a darker coloured specimen.

The typical subspecies is characterised by the bluish-grey hind tibia, with two whitish rings at the base and reddish apex and tarsus.

Geographical distribution.—Pakistan ; Afghanistan ; Northern, Eastern and Southern India ; E. Persia ; Ceylon.

3b. *Eyprepocnemis alacris impicta* Uvarov, 1933

1933, *Euprepocnemis alacris impictus* Uvarov, *Trud. zool. Inst. Acad. Sci. U.S.S.R.* **1** : 232. Type ♂. " SW. Persia, Shuster, Arabistan." Leningrad Mus.
1933, *Euprepocnemis deserticolus* Uvarov, *Proc. zool. Soc. Lond.* **1933** : 270. Type ♀. " S. Arabian desert." Brit. Mus. **(syn. nov.).**
1952, *Euprepocnemis chloropus* Ramme, *Vidensk. Medd. naturh. Foren. Kbh.* **114** : 200, Pl. 3, f. 5. Type ♂. " Pakistan, Jakobabad." Copenhagen Mus. **(syn. nov.).**

No structural differences exist between this subspecies and the typical, for it differs only in its uniformly grey or olive-grey hind tibia with two whitish rings at the base and slightly ochraceous apex and tarsus. The subspecies occurs in the western part of the area of the species.

The paratype of *E. alacris impicta* and the type of *E. deserticolus* appear identical. The description of *E. chloropus* agrees completely with the characters of *E. alacris impictus*.

Geographical distribution.—Pakistan ; SW. Persia ; Iraq ; SE. Arabia.

4. *Eyprepocnemis smaragdipes* Bruner, 1910. (Fig. 4)

1910, *Euprepocnemis smaragdipes* Bruner, *Voeltzkow Reise, Stuttgart*, **2** : 643. Type ♂. " Madagascar : Sainte Marie." Berlin Mus.
1914, *Euprepocnemis malagassus* I. Bolivar, *Trab. Mus. Madr.* **20** : 11. Type ♂. " Madagascar." Madrid Mus. **(syn. nov.).**

Since both the synonymised species were described without indicating single types, I am designating here the male specimens as such.

The types of both of the species were found to be conspecific. The only difference between them is that the hind tibiae of *smaragdipes* are greenish-grey on the whole length, while in *malagassus* they are bluish-grey in the basal and reddish in the apical half, but in series of specimens all intermediate forms are found.

Geographical distribution.—The species is known from Madagascar and Comoro Islands.

5. *Eyprepocnemis kalkudensis* Henry, 1937. (Fig. 5)

1937, *Euprepocnemis kalkudensis* Henry, *Ceylon J. Sci.* **20** (B) **3** : 343, Pl. 14, f. 1–4. Type ♂. " Ceylon : Eastern Province, Kalkudah." Brit. Mus.

This species is extremely similar to the Madagascan *E. smaragdipes* Bruner, from which it differs in the form of the concavity of the fastigium of the vertex.

Geographical distribution.—Ceylon.

6. *Eyprepocnemis noxia* Dirsh, 1950. (Fig. 6)

1950, *Eyprepocnemis noxius* Dirsh, *Bull. ent. Res.* **41** : 317, f. 2, 4. Type ♂. Sudan, Plains 30 miles west of Gedaref. Brit. Mus.

The colour of the hind tibia in the type and paratypes of the species was described as " pink-violet " *i.e.* purple or purplish. In a large series of specimens from the Sudan and elsewhere, both purple and blue tibiae, with two whitish rings at the base, occur, often in the same population.

Geographical distribution.—French Sudan ; Sudan ; Eritrea ; Ethiopia ; Kenya ; Uganda ; Tanganyika.

7. *Eyprepocnemis rosea* Uvarov, 1942. (Fig. 7)

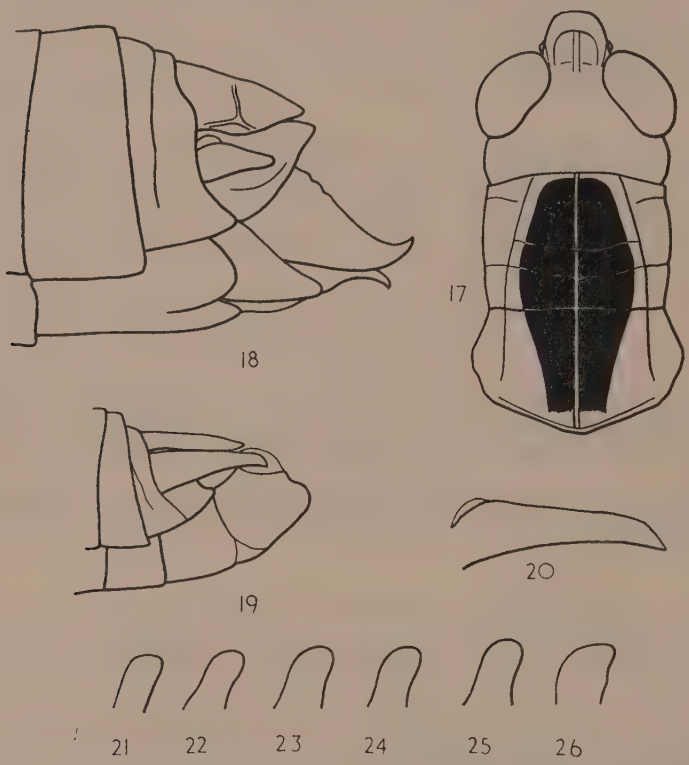
1942, *Euprepocnemis roseus* Uvarov, *Ann. Mag. nat. Hist.* (11) **9** : 597, f. 4 R. Type ♂. India, Punjab, Simla, 3500–5500 feet. Brit. Mus.

Geographical distribution.—India ; besides the type locality, the species is known from the Dehra-Dun, United Provinces ; and Assam, Shillong, 5000 feet.

8. *Eyprepocnemis cyanescens* Uvarov, 1942. (Fig. 8)

1942, *Euprepocnemis cyanescens* Uvarov, *Ann. Mag. nat. Hist.* (11) **9** : 599, f. 4c. Type ♂. India, Madras, Courtallam Hills. Brit. Mus.

Only the single male type of this species is known.



Figs. 17–26.—*Eyprepocnemis plorans* Charp. (17) Head and pronotum from above. (18) End of abdomen, female, lateral view. (19) Ditto, male. (20) Male cercus, lateral view. (21)–(26) Prosternal tubercle : (21) subsp. *ibandana*, extreme form (Congo) ; (22) subsp. *plorans* (Palma) ; (23) subsp. *plorans* (Palestine) ; (24) subsp. *plorans* × *ornatipes* (Eritrea) ; (25) subsp. *ornatipes* (Nigeria) ; (26) subsp. *meridionalis*, extreme form (Tanganyika).

9. *Eyprepocnemis hokutensis* Shiraki, 1910. (Fig. 9)

1910, *Euprepocnemis hokutensis* Shiraki, *Acrididen Japans, Tokyo :* 81, pl. 2, fig. 2 a–c. Type ♂. Formosa, Hokuto. Shiraki collection.

1932, *Euprepocnemis chinensis* Willemse, *Natuurh. Maandb., Limburg* **8** : 105, f. 3. Type ♂. China, prov. Kiangsu. Stockholm Mus.

Geographical distribution.—Formosa ; China ; Kwantung ; Nanking ; Hupeh ; Fukien ; Kiang-su ; also recorded from Kuantung and Kuangsi north of Kiangsu (Tinkham 1935, 1940, *Lignan Sci. J.* **14, 19**).

10. *Eyprepocnemis javana* Willemse, 1933. (Fig. 16)

1933, *Euprepocnemis javana* Willemse, *Nat. Maandbl.* **22** : 117, f. 2. Type ♂. Central Java, Kedoengdjati. Buitenzorg Mus.

The species is nearest to *E. hokutensis* Shir., from which it differs in its much smaller size and relatively longer elytra. It is known only from Java.

11. *Eyprepocnemis unicolor* Tarbinsky, 1928. (Fig. 10)

1928, *Euprepocnemis unicolor* Tarbinsky, *Bull. Inst. Zool. Phytopath., Leningrad* **4** : 60. Type ♂. Khiva, Altyn Kul. Leningrad Mus.

This abberant species of the genus is remarkable in its uniform pale ochraceous coloration without any pattern on the pronotum and elytron ; the hind tibia is light- or orange-red.

Geographical distribution.—Besides the originally described series from Khiva (Altyn Kul ; Mukus, Tshimbai Dist.), the species is known also from the following regions of Middle Asia : Kara-Kalpakia ; Turkmenistan ; Uzbekistan; Tadzhikistan (Mistshenko, 1952, *Acridoidea of U.S.S.R.*).

12. *Eyprepocnemis olivacea* Ramme, 1941

1941, *Euprepocnemis olivacea* Ramme, *Mitt. zool. Mus. Berl.* **25** : 207, Pl. 21, f. 54. Type ♂. Burma : Mt. Victoria, Chin Hills, 1000 m. Berlin Mus.

This is the second abberant species of the genus, uniformly coloured without pattern on the pronotum and elytra. The hind tibia in the basal two-thirds is light olive-green, in the apical third light crimson-red.

Only the originally described series of the species is known.

13. *Eyprepocnemis burmana* Ramme, 1941. (Fig. 11)

1941, *Euprepocnemis burmana* Ramme, *Mitt. zool. Mus. Berl.* **25** : 208, Pl. 21, f. 2. Fig. 54. Type ♂. Upper Burma : Mt. Popa, 1000 m. Berlin Mus.

Geographical distribution.—Burma. Beside the type locality the species is known from Paikara Peak, 6000 feet.

14. *Eyprepocnemis brachyptera* Bruner, 1910

1910, *Euprepocnemis brachypterus* Bruner, *Voeltzkow Reise, Stuttgart,* **2** : 643, f. 17. Type ♂. Central Madagascar. Berlin Mus.

The author did not designate the type when describing the species, and the male specimen is designated here as such.

Geographical distribution.—Known from Madagascar only.

15. *Eyprepocnemis abyssinica* Uvarov, 1921. (Fig. 12)

1921, *Euprepocnemis abyssinica* Uvarov, *Trans. ent. Soc. Lond.* **1921** : 118. Type ♂. Abyssinia : Zegi Tsana. Brit. Mus.

Only the originally described series of the species is known.

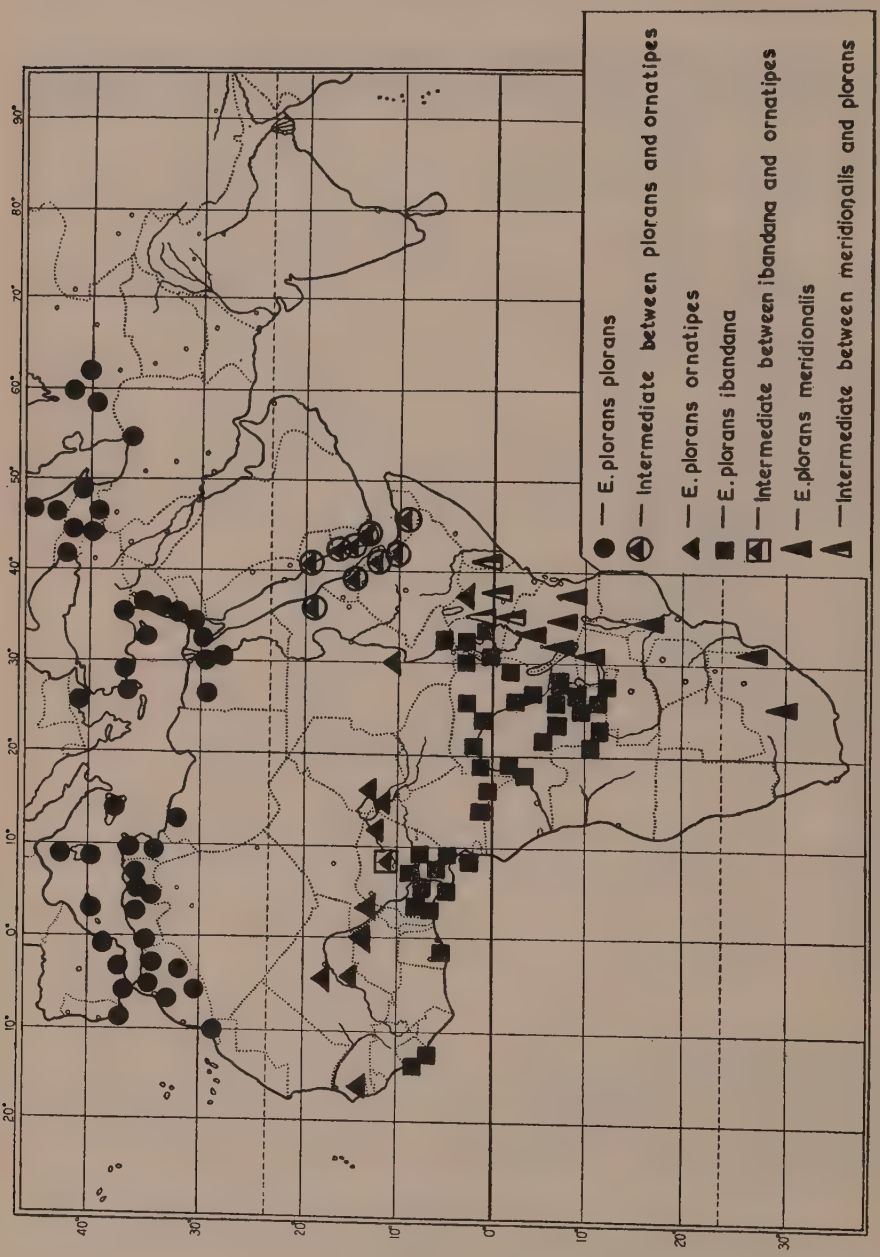


Fig. 27.—Map of distribution of subspecies of *Eyprepocnemis plorans* Charp.

16. *Eyprepocnemis montana* Chopard, 1945

1945, *Euprepocnemis montanus* Chopard, *Rev. franç. Ent.* **11** : 177. Type ♂. Bambouto Mts. Paris Mus.

The male and female were described, without designating the type, and the male is here designated as such.

Geographical distribution.—Cameroons. The species is known only from the typical locality.

17. *Eyprepocnemis montigena* Johnston, 1937. (Fig. 13)

1937, *Euprepocnemis montigena* Johnston, *Proc. R. ent. Soc. Lond.* (B) **6** : 222, f. 4. Type ♂. Mount Kenya. Brit. Mus.

Geographical distribution.—Kenya. Besides the typical locality the species is known from Mt. Uragues, Samburu District.

18. **Eyprepocnemis burtti** sp. n. (Fig. 14)

♂ (Type). Comparatively large. Antenna with 26 segments, shorter than head and pronotum together. Fastigium of vertex parabolic, longer than its width, with a strong median carinula. Lateral carinae of pronotum slightly and regularly excurved and slightly converging forwards. Prosternal tubercle with inflated, recurved and flattened apex. Elytron shortened, reaching sixth abdominal tergite ; its anterior margin strongly excurved at basal half ; apical half narrowing ; reticulation sparse. Wing shorter than elytron. Hind femur moderately slender. Subgenital plate comparatively narrow. Cercus with slender apical part and acute, comparatively little downcurved, apex.

General coloration brownish. Brown spot on dorsum of pronotum broad, occupying almost whole disc and a little narrowed in posterior end. Elytron with few small, indistinct dark spots. Hind femur ochraceous, internally and below, external side brownish with a narrow blackish, longitudinal stripe in the middle ; hind knee with blackish, transverse preapical fascia and a blackish crescent spot. Hind tibia in basal half blue, with whitish ring at the base, apical half red ; tarsus red.

♀ (paratype). As the male, but larger. Valves of ovipositor short, comparatively robust, with little curved apices.

Length of body : ♂ 25–25·4, ♀ 36·5–41 ; pronotum : ♂ 5–5·2, ♀ 5·8–7 ; hind femur : ♂ 16·2–17·6, ♀ 20·6–25·2 mm.

Tanganyika : Kibarioni, Mpwapwa, 6000 feet, 20.ix.1947, 1 ♂ (Type), 2 ♀. Mpwapwa, Mt. Wilkins, 5800 feet, 10.iv.1938, 1 ♂, 1 ♀ (*Dr. E. Burtt*). Type in the British Museum (Nat. Hist.)

The new species differs strongly from all known African brachypterous species of the genus in its much larger size, more elongated fastigium of the vertex and in the sparse reticulation of the elytra. It probably belongs to the same group of species as *E. plorans*.

19. *Eyprepocnemis keniensis* Johnston, 1937. (Fig. 15)

1933, *Euprepocnemis brachyptera* Sjöstedt, *Ark. Zool.* 26A (11) : 24, Pl. 2, f. 5. Type ♀. Mount Elgon. Stockholm Mus. (Nom. preoc.).
1937, *Euprepocnemis keniensis* Johnston, *Proc. R. ent. Soc. Lond* (B) **6** : 223.

The species is known only from the typical locality.

A NEW AUSTRALIAN PIESMID (HEMIPTERA)

By Carl J. Drake
(*Smithsonian Institution, Washington, D.C.*)

The genus *Mcateella*, erected in 1924 (Drake, *Proc. ent. Soc. Wash.* **26** : 85–86) for the reception of *M. splendida* Drake, is known only from the mainland of Australia. Since then, Hacker has characterised *M. elongata* (Hacker, 1937, *Mem. Qd. Mus.* **9** : 30–31) from Queensland and *M. interioris* (Hacker, 1928, *op. cit.*: 187) from South Australia. In the former paper Hacker reported

Fig. 1.—*Mcateella gibber* sp. n. (holotype male).

netting *M. splendida* (nymphs and adults) in numbers on the flowers of *Acacia cunninghamii* and *M. elongata* on the flowers of another tree of the same genus, *A. decurrens*. These are so far the only known host-records in the genus.

The present paper describes a fourth species of *Mcateella* from West Australia. The type male (fig. 1) has been illustrated by Arthur Smith of the

British Museum (Natural History). In addition he has also figured a male of *Miespa reedi* (Drake) (fig. 2) from Chile. It is interesting to note that characters of the head place the latter genus closer to *Mcateella* than to *Piesma*, which latter does not occur in Australia but is represented by a number of species in Europe, Asia, Africa and the Americas. *Mcateella*, in both alate and brachyp-

Fig. 2.—*Miespa reedi* Drake (male).

terous forms, has no membrane in the hemelytra. The rostral channel is also different.

Mcateella gibber sp. n. (Fig. 1)

Small, dark rufus-brown, the hemelytra and pronotum slightly clouded with blackish; dorsal surface provided with very short, tiny, flake-like, golden, inconspicuous pubescence; body beneath rufofuscous with blackish areas; rostral laminae whitish. Tips of tarsi and last half of fourth antennal segment blackish. Allotype, somewhat teneral, with hemelytra brownish testaceous and abdomen beneath stramineous. Length, 2·80 mm.; width, 1·25 mm.

Head 1·40 mm. wide across eyes, depressed above, with tylus and juga subequal in length; tylus scarcely twice as wide as a jugum. Labium brownish-black, rather stout, scarcely reaching beyond mesosternum; sulcus fairly deep on pro- and mesosternum,

with channel narrowed apically so that sides come flatly in contact with each other posteriorly; metasternal sulcus represented by a median longitudinal ridge. Antennae short, rather finely granulate, with a short, pale setal hair arising from each granule; segment I short, very stout, about one-third as wide as long, slightly surpassing tylus; IV fusiform; measurments—I, 14; II, 13; III, 18; IV, 20. Legs short stout, rather coarsely granulate; femora very strongly swollen; tibiae with granules tending to be arranged in rows; second tarsal segment longer than first.

Pronotum strongly gibbose across humeral angles, areolately punctate, broadly blackish on each side of median line; collar distinct, as also calli; paranota whitish, narrow, uniseriate, the areolae small and elongate. Scutellum distinct. Elytra transversely convex above, closely areolate, with cells scarcely larger than punctures of pronotum; clavus sharply defined; costal area narrow, uniseriate, whitish with areolae small and ovate; discoidal area with boundary vein not very sharply defined, not divided by a longitudinal vein (see fig. 1). Wings present. Ocelli plainly visible in anterior view.

Holotype ♂, West Australia: Mundaring Weir, 19–23.ii.1936. (*R. E. Turner*). In British Museum (Nat. Hist.). Allotype (female, teneral), same data as type.

As can be seen from figures 1 and 2, the heads of *Mcateella* and *Miespa* are very similar in general aspect, though very different from *Piesma*. Other differences between these three genera have been discussed above.

NEW WEST AFRICAN *ENOCHRUS* (COLEOPTERA : HYDROPHILIDAE)

By J. Balfour-Browne
(*British Museum* (*Natural History*))

In describing *Enochrus* (*Methydrus*) *meracus* J. Balfour-Browne (1952, *Bull. Inst. franç. Afr. noire* **14** : 133) the only described African species at that time with which it was possible to compare it in size was *E.* (*M.*) *natalensis* (Gemminger and Harold), although the two species, on the form of the mesosternal lamina, belong to two different groups, *natalensis* having the lamina with a distinct mucro, *meracus* having the lamina smoothly rounded and unarmed as in *anticus* Régimbart.

Further work on accumulated undetermined and recently received material of small African species of the subgenus has proved that a number of species are present in West Africa in addition to *meracus*, five forms being known to me of which four are described below. One additional species from the Mont Nimba Reserve in French Guinea, although also apparently belonging to this group,must be placed in the nominate subgenus as redefined by d'Orchymont (1939, *Bull. Ann. Soc. ent. Belg.* **79** : 374) owing to the absence of the small ciliate emargination of the fifth ventrite which characterises *Methydrus*. As will be seen in the discussion of the new species, *E.* (*E.*) *pellax* sp. n., the validity of the subgeneric character seems questionable. The comparative lengths of the three distal segments of the maxillary palpi of the species described below show that all except *furculus* would appear to fall within the definition of *Enochrus* (s. str.) as possessing subequal penultimate and distal segments. However, the nominate subgenus has the fifth ventrite entire and margined, without a ciliate emargination. There appears, therefore, to be no alternative to treating *pellax* as an *Enochrus* (s. str.) and the remaining species as *Enochrus* (*Methydrus*), at least until a re-assessment of the subgeneric groups within the genus has been effected on all the known world species.

One of the new species described hereafter, *E.* (*M.*) *furculus* sp. n., is entirely exceptional in the genus in two characters of the aedeagus : the medial lobe is laterally compressed and comprises only a single ramus, and the lateral lobes are ventrally bifurcate. No other species of the genus known to me has a median lobe composed of only one ramus ; in all other species there are dorsal and ventral rami of the median lobe and in no other species of the genus is the lateral lobe bifurcate. This species, although placed with the *meracus* group on the form of the mesosternal lamina, is clearly very isolated and its real relationship remains unknown.

The *meracus*-group may be defined as follows : small species of under 4 mm. in length with the mesosternal lamina low, more or less regularly arcuate and without trace of a mucro. The presence of a ciliate emargination of the fifth ventrite may also be regarded as a normal character of the group but its absence may not necessarily exclude a species from the group.

The following key, admittedly unsatisfactory because of the lack of sharply defined characters, may help in determination, but the aedeagal character should always be relied upon to confirm a determination.

KEY TO THE SPECIES OF THE *meracus*-GROUP

1 Fifth ventrite with a distinct ciliate emargination 2
1* Fifth ventrite without any ciliate emargination, with normal hairs on the entire periphery . . . . . **pellax** sp. n.
2 Labrum dark; clypeus with broad dark band of uniform width delimiting distinct flavescent ante-ocular spots 3
2* Labrum not dark; clypeus yellow or flavescent with more or less extensive median basal dark cloud, if the dark cloud attains apex it is not of uniform width at base and apex 4
3 Pronotal punctures on disc slightly finer and sparser; flavous border of pronotum and elytra narrower and more sharply delimited internally; median lobe of aedeagus shorter than lateral lobes, dorsal ramus of median lobe regularly attenuate from middle to apex **meracus** J.B-B.
3* Pronotal punctures on disc slightly stronger and slightly closer; flavous border of pronotum and elytra broader and very vaguely delimited internally; median lobe of aedeagus as long as lateral lobes, dorsal ramus of middle lobe subparallel from middle to apex . **petersenae** sp. n.
4 Pronotal and elytral punctures denser and stronger, of uniform strength all over; elytra showing distinct tendency to linear arrangement of punctures, at least here and there; claws of anterior and posterior legs of male distinctly hooked and with a large basal tooth; parameres bifurcate on ventral face . . . . . **furculus** sp. n.
4* Pronotal and elytral punctures sparser, finer on disc, stronger towards sides; no tendency to linear arrangement of punctures on elytra; anterior claws of male hooked and with basal tooth, posterior claws simple; parameres simple, not bifurcate 5
5 Larger species; sides of pronotum and elytra broadly flavescent; punctures finer and closer on disc; median lobe of aedeagus broad and apically widely rounded, parameres exserted at apex . **merops** sp. n.
5* Smaller species; sides of pronotum narrowly flavo-rufous, of elytra barely paler than disc; punctures stronger and less close on disc; median lobe of aedeagus narrow, attenuated to bluntly pointed apex, parameres not exserted at apex, elongate-attenuate . . . **rutilus** sp. n.

Enochrus (Enochrus) pellax sp. n.

Black or dark castaneous; head, including labrum, black with only very narrow flavous ante-ocular spots; pronotum sharply bordered at sides, base and apex, elytra sharply bordered at sides with flavous; punctation of dorsum uniform, strong and dense; mesosternal lamina low, arcuate, unmucronate; fifth ventrite entire, without trace of even a shallow ciliate emargination.

Head black, including labrum, clypeus at sides with only very narrow indistinct flavous ante-ocular spots; strongly but quite finely densely punctate, punctural interstices about equal to diameter of punctures; frontal systematic punctures not recognisable; maxillary palpi flavous with distal segment infuscate, second, third and fourth segments in length as 16 : 11 : 10. *Pronotum* black, sharply bordered at sides and, more narrowly, at base and apex with flavous; punctured as on head; anterolateral and lateral systematic punctures scarcely discernible, barely larger than general punctation; sides very weakly rounded, margined, margin continued across base and apex excessively finely. *Scutellum* densely punctate. *Elytra* black, sharply bordered along sides from base to apex with flavous; punctate as on pronotum; systematic series of punctures not discernible. *Venter* piceous; mentum coarsely punctate at apex; prosternum almost flat at middle, anterior edge in

middle roundly produced, not mucronate ; mesosternal lamina low, regularly arcuate, not mucronate ; metasternum flat in middle anteriorly, not at all compressed behind intercoxal process, posteriorly with narrow elongate lanceolate glabrous spot. *Legs* testaceous. *Aedeagus* simple trilobate, median lobe shorter than parameres, ventral ramus of median lobe about one-third length of spatulate dorsal ramus. *Sexual dimorphism :* all claws of male abruptly bent downwards at middle, of female regularly arcuate (middle and hind claws of male type missing).

Holotype ♂, French Guinea : Nimba, vii.–xii.1951 (*Lamotte and Roy*), 3·168 × 1·653 mm. (Head extended.) In the Muséum national d'Histoire naturelle, Paris.

Paratypes : 2 ♀, same date as holotype ; 1 ♂, 1 ♀, Fouta Djallon, Dalaba, 1200 m., 16 and 22.vi.1951 (*J. Bechyne*).

This species so closely resembles the *meracus*-group in facies, and agrees with it in the structure of the mesosternal lamina, that it is difficult to accept that it must be placed in a different subgenus owing to the absence of the emarginate ciliate apex of the fifth ventrite which has been taken to define the subgenus *Methydrus*. The other character which has been used to differentiate *Methydrus*—the presence or absence on the pronotum of the systematic punctures—has already been rejected (J. Balfour-Browne, 1939, *Ann. Mag. nat. Hist.* (11) **3** : 477–8) as being a question of degree. It would appear that even the ciliate emargination of the fifth ventrite may not be a more consistent character.

On facies and character of the punctation *pellax* may readily be confused with *E. furculus* sp. n. but, apart from the entire fifth ventrite, may be recognised therefrom by the extensively black clypeus and labrum and by the subequal third and fourth segments of the maxillary palpi.

The aedeagus rather closely suggests *E. petersenae* sp. n. in the similarly spatulate dorsal ramus of the median lobe but in *pellax* the ventral ramus is only one-third the length of the dorsal ramus against one-half the length in *petersenae*.

Enochrus (Methydrus) petersenae sp. n.

Testaceous, head and pronotum brownish, sides of clypeus in front of eyes largely, sides of pronotum broadly and sides of elytra vaguely flavo-testaceous ; maxillary palpi flavous ; venter and femora rufo-piceous, tibia and tarsi testaceous ; head densely and finely, pronotum finely but not densely, elytra finely and quite densely punctate.

Head black on frons, brownish on labrum and clypeus with, on each side in front of the eyes a large yellow spot ; densely finely punctate, punctural interstices about equal to diameter of punctures ; frontal systematic punctures distinct, about one and one-half times diameter of general punctation ; maxillary palpi flavous, second, third and fourth segments of lengths as 20 : 12 : 11. *Pronotum* testaceous, disc vaguely brownish and sides widely flavo-testaceous ; punctured, rather more finely and distinctly less closely than on head, punctural interstices being about twice to three times diameter of punctures ; anterolateral and lateral systematic punctures distinct, at least twice diameter of general punctation ; sides straight, anterior angle strongly, posterior angle abruptly rounded, margined, margin not visibly continued across base and apex. *Scutellum* finely but distinctly punctured. *Elytra* testaceous, or pale brownish-testaceous, sides vaguely flavo-testaceous ; in scutellary region and near apex quite densely, on disc rather less closely, finely punctate ; systematic series not distinguishable, not or scarcely larger than general punctation ; sutural stria distinct. *Venter* rufo-piceous, coxae more clearly rufous ; mentum strongly but sparingly punctate ; prosternum medially roundly longi-

tudinally elevated, anterior edge in middle with very small mucro; mesosternal lamina low, arcuate, quite unmucronate; metasternum with an elongate lanceolate median glabrous patch posteriorly. *Legs* with femora, except " knees ", rufo-piceous, " knees ", tibiae and tarsi rufo-testaceous. *Aedeagus* simply trilobate, parameres inflated at basal third, thence attenuate to narrow slender apex; median lobe with ventral ramus about half length of dorsal ramus which is just about as long as lateral lobes, dorsal ramus weakly spatulate. *Sexual dimorphism :* claws of all legs of male sharply deflexed at middle, basal lobe small; claws of all legs of female regularly arcuate.

Holotype ♂, GHANA : near Agogo, 1° 5′ W., 6° 50′ N., in unnamed tributary of River Afram, " in sandy gravels above water line " (*Miss Janet Petersen*), 2·871 × 1·584 mm. In the British Museum (Nat. Hist.).

Paratype : 1 ♀, same data as holotype.

This species will readily be mistaken for *E. natalensis* (Gemminger and Harold), with which it occurred, on superficial examination, resembling that species very closely in size and colour. The sculpture of the dorsum is, however, never so dense or so sharply impressed. Examination of the mesosternal lamina at once separates the two species and the aedeagus emphasises the distinction. *E. petersenae*, in aedeagus, approaches most closely to the new species, *E. pellax*, described above, from Mont Nimba, but has the ventral ramus of the median lobe half the length of the dorsal ramus which is about as long as the lateral lobes, whereas in *pellax* the ventral ramus is only about one-third the length of the dorsal ramus, which is clearly shorter than the lateral lobes. *E. petersenae* is quite distinct from the other species of the *meracus*-group by the spatuliform dorsal ramus of the median lobe.

Enochrus (Methydrus) furculus sp. n.

Piceo-castaneous, labrum, clypeus widely anterolaterally, sides of pronotum narrowly and sides of elytra apically flavo-testaceous; maxillary palpi flavous; femora piceous, tibiae and tarsi rufo-testaceous; uniformly finely and densely punctate; elytra here and there with distinctly linear arrangement of punctures.

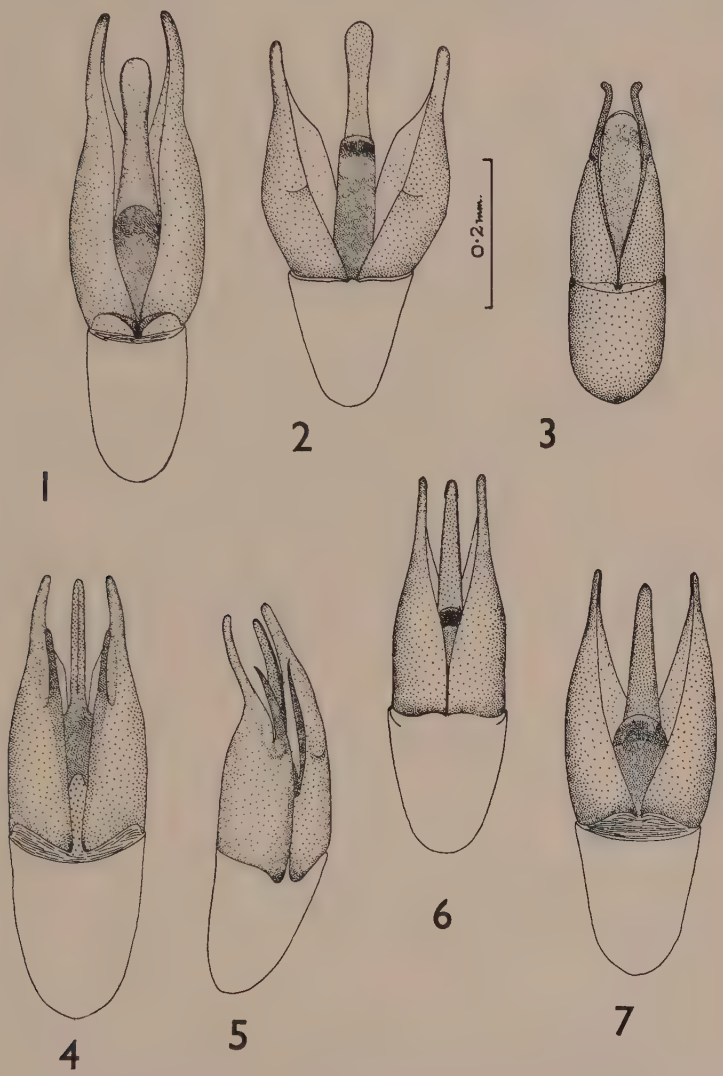
Head piceo-castaneous, labrum clear flavous, clypeus flavous with an extensive median basal piceous clouding; closely finely punctate, punctural interstices from one to one and one-half times diameter of punctures; frontal systematic punctures distinct, about twice diameter of general punctation; maxillary palpi flavous, second, third and fourth segments in length as 16 : 12 : 8. *Pronotum* piceo-castaneous, sides narrowly flavo-testaceous, base and apex vaguely very narrowly testaceous; punctured as strongly and as closely as head; anterolateral and lateral systematic punctures not very distinct, not much larger than general punctation but more strongly impressed; sides almost straight, anterior angle strongly, posterior angle abruptly rounded, margined, margin continued excessively finely across base and apex. *Scutellum* very finely punctate. *Elytra* piceo-castaneous, sides towards apex vaguely flavo-testaceous; uniformly densely punctured as on pronotum with, here and there, distinct tendency to linear arrangement of punctures; systematic series not very distinct, not much larger than general punctation; sutural stria distinct. *Venter* black, mentum shining, anteriorly with some coarse punctures; prosternum medially roundly longitudinally tectiform, middle of anterior edge produced into a short mucro; mesosternal lamina low, regularly anteroposteriorly arcuate, without mucro; metasternum with a median posterior longitudinal glabrous patch. *Legs* with femora, except the " knees ", black, " knees ", tibiae and tarsi rufo-testaceous. *Aedeagus* trilobate, median lobe about as long as parameres, of only a single ramus (? dorsal), laterally compressed, filiform; lateral lobes regularly attenuate to apex which is as wide as median lobe, on ventral face at about middle produced into an acutely pointed, hard, free spine, not apparently

hinged at base. *Sexual dimorphism :* claws of anterior and posterior tarsi of male abruptly deflexed at middle and with strong basal lobe (middle legs missing), of female with small basal lobe and regularly arcuate rami.

Holotype ♂, NIGERIA : Ibadan, 2.iv.1957, "taken in M/V light trap" (*J. L. Gregory*), 3·465 × 1·881 mm. In the British Museum (Nat. Hist.).

Paratypes : 4 ♀, same date as holotype.

As already mentioned in the introductory note, this species is entirely apart from all species of *Enochrus* known to me in the remarkable structure of the



FIGS. 1–7.—(1–4), Aedeagus, ventral aspect of (1) *Enochrus* (s. str.) *pellax* sp. n. (2) *Enochrus* (*Methydrus*) *petersenae* sp. n. (3) *E.* (*M.*) *merops* sp. n. (4) *E.* (*M.*) *furculus* sp. n. (5) Aedeagus, ventrolateral aspect of *E.* (*M.*) *furculus* sp. n. (6–7), Aedeagus, ventral aspect of (6) *E.* (*M.*) *rutilus* sp. n. ; (7) *E.* (*M.*) *meracus* J. Balfour-Browne.

aedeagus and its relationships remain unknown. It is included in the *meracus*-group only on the structure of the mesosternal lamina. Superficially the species resembles *meracus* J. Balfour-Browne but is at once separated by the flavous labrum and clypeus with only a median basal fuscous clouding on the latter, whereas in *meracus* the labrum is black and clypeus black with isolated ante-ocular spots. The two species were both taken together at Ibadan.

Enochrus (Methydrus) merops sp. n.

Piceo-castaneous, labrum, clypeus except for a more or less extensive median basal clouding, sides of pronotum broadly, sides of elytra more or less broadly flavous; head finely and densely, pronotum much more finely and more sparingly, elytra rather sparingly but distinctly punctate.

Head black or piceo-castaneous, labrum and clypeus flavous, the latter with more or less extensive median basal black or piceous clouding; finely and quite densely punctate, punctural interstices from one and one-half to twice diameter of punctures; frontal systematic punctures distinct, from two to three times size of general punctation; maxillary palpi flavous, second, third and fourth segments of lengths as 15 : 10 : 9. *Pronotum* black or piceo-castaneous, sides widely, apex narrowly flavous; punctured much more finely and distinctly more sparingly than head, punctural interstices from three to five times diameter of punctures; anterolateral and lateral systematic series distinct, punctures about three times diameter of general punctation; sides straight, margined, margin continued across base and apex excessively finely; anterior angles very widely, posterior angles more sharply rounded. *Scutellum* densely finely punctate. *Elytra* black or piceo-castaneous, sides throughout broadly banded with flavous; punctured about as strongly as head but rather less closely, interstices being from two to four times diameter of general punctation; sutural stria distinct. *Venter* piceous, mentum with few strong punctures; prosternum medially longitudinally roundly tectiform, anterior edge in middle produced into a small mucro; mesosternal lamina low, arcuate, non-mucronate. *Legs* with femora, except " knees ", piceous, " knees ", tibiae and tarsi rufo-testaceous. *Aedeagus* short and broad, median lobe with dorsal and ventral rami equal, slightly shorter than parameres, broadly subparallel to rounded apex; parameres regularly attenuate almost to apex which is slightly inflated and turned outwards. *Sexual dimorphism:* anterior claws of male abruptly bent downwards at middle and with large basal lobe, intermediate and posterior claws regularly arcuate, with small basal lobe; all claws of female regularly arcuate with small basal lobe.

Holotype ♂, French Guinea: Fouta Djallon, Dalaba, 1200 m., 22.vi.1951 (*J. Bechyne*), 3·365 × 1·782 mm. In the Frey Museum, Munich.

Paratypes: 2 ♂, 4 ♀, same data as holotype. Cote d'Ivoire: Toumodi, 10 specimens (*Mission Alluaud et Chappuis*); Ndidza, 1.vi.1952, 1 ♀ (*Cachan*). Cameroons: Meloundou, 22.v.1955, 1 ♀ (*Mouchet*). Nigeria: Ibadan, 2.iv.1957, " at M/V light trap ", 243 specimens (*J. L. Gregory*). Fernando Po: Mioko, 1700–2000 m., 8.xii.1951, 1 ♂ (*Dekeyser, Lepesme et Villiers*) Angola: env. de Dundo, Forêt de la Luachimo, 25.v.1948, 1 ♂, 1 ♀ (*A. de Barros Machado*).

This species has been found to be somewhat variable in the extensiveness of the flavous marking of head, pronotum and elytra; in the darkest specimens, which are shining black, the yellow marking of the clypeus may be reduced to quite separated ante-ocular spots with a broad median black band right to the apex, but the labrum always remains clear flavous. The greater extension of black on the head always appears to be correlated with greater extension of black on the pronotum and elytra.

The species much resembles *E. furculus* sp. n. in size and colour and careful attention to the type of punctation of the dorsum is required for recognition. In all cases the pronotal punctation is noticeably finer and less dense than in *furculus*. The aedeagus is entirely distinctive from all of the other species of the group.

Enochrus (Methydrus) rutilus sp. n.

Deep castaneous, labrum, clypeus, except for a broad basal clouding, and sides of pronotum narrowly rufo-testaceous ; maxillary palpi flavous ; venter piceous, mouth-parts, femora, tibiae and tarsi rufo-testaceous ; head and elytra distinctly, not densely, punctate, pronotum finely and sparingly punctulate.

Head black, labrum and clypeus, except for a broad basal clouding, rufo-testaceous ; distinctly punctate, punctural interstices from two to four times diameter of punctures ; frontal systematic punctures barely distinct ; maxillary palpi flavous, second, third and fourth segments in length as 11 : 7 : 7. *Pronotum* castaneous, anterior angles narrowly rufo-testaceous ; finely and sparingly punctate, punctural interstices from three to six times diameter of punctures ; anterolateral and lateral systematic punctures very distinct, three or four times diameter of general punctation ; sides almost straight, margined, margin continued across base excessively finely but not visibly across apex ; anterior angles widely, posterior angles sharply rounded. *Scutellum* densely punctate. *Elytra* regularly, distinctly but not densely punctate, punctural interstices on disc about four times diameter of punctures ; rather more closely punctate towards apex ; deep castaneous, sides not or barely paler ; systematic punctures not discernible ; sutural stria distinct. *Venter* piceous, mouth-parts rufo-testaceous ; mentum quite thickly punctate anteriorly, nearly impunctate basally ; prosternum barely longitudinally rounded tectiform in middle, anterior edge obtusely mucronate in middle ; mesosternal lamina very low, regularly arcuate, without mucro ; metasternum posteriorly in middle with broadly lanceolate patch. *Legs*, including femora, rufo-testaceous. *Aedeagus* trilobate, median lobe as long as parameres, regularly attenuate to just before the weakly inflated apex ; parameres regularly attenuate to the rather long, narrow, apices ; ventral ramus of median lobe only about two-fifths length of dorsal ramus. *Sexual dimorphism :* claws of anterior pair of legs of male abruptly bent downwards at middle, of intermediate and posterior legs of male and of all legs of female regularly arcuate.

Holotype ♂, Nigeria : Ogoja Province, Abakaliki, 20.ii.1949, " River, gravel banks " (*B. Malkin*), 2·574 × 1·386 mm. In the British Museum (Nat. Hist.).

Paratypes : 4 ♂, 2 ♀, same data as holotype ; 1 ♂, British Cameroons : Mamfe, 7–11.i.1949, " Rain-forest ; clear stream, gravel and sand " (*B. Malkin*).

The aedeagus suggests that this species is related to *E. meracus* J. Balfour-Browne, but the median lobe is less broad at the base and slightly inflated at the apex, and the parameres are much more lengthily attenuate at the apex. The species does not very closely resemble any of the described species, the rather marked difference in the size of the pronotal punctures compared with those of the elytra and their greater distance apart is readily discernible and is, in practice, diagnostic, although not unlike *E. merops* sp. n. from which species it is distinguished by the narrowly flavescent sides of the pronotum and elytra and the quite dissimilar aedeagus. Both of the last two species are alike in that the male has only the claws of the anterior pair of legs strongly recurved.

SOME CHIRONOMIDAE (DIPTERA) FROM RÉUNION

By Paul Freeman
(*British Museum* (*Natural History*)).

Very few Chironomidae have been collected or reported from the Mascarene Islands. Edwards (1923, *Ann. Mag. nat. Hist.* (9) **12** : 330–7) described a species of *Cricotopus* and made mention of two species of *Chironomus* in poor condition from Rodriguez ; no other records are known to me either from Rodriguez, Réunion or Mauritius. The present collection which contains representatives of 11 species is therefore of considerable interest and I am very grateful to the collector, Monsieur J. Hamon, for making it available to me.

Of the 11 species, ten occur on the African mainland, three being known as well from the Seychelles or from Madagascar or from both. The eleventh species, *Cricotopus rodriguensis* Edwards, has previously only been recorded from Rodriguez, but there are allied species to be found on the African mainland. For full details and descriptions of the species mentioned below reference should be made to my Studies of the Chironomidae of Africa South of the Sahara which are appearing in volumes 4–6 of the *Bulletin of the British Museum* (*Natural History*) (*Entomology*) (1955–58).

Most of the specimens have been returned to l'Office de la Recherche Scientifique et Technique Outre-Mer for placing in their collections at Bondy (Seine) but representatives wherever possible have been retained in the British Museum. All the localities quoted are in Réunion and all the specimens were collected by Monsieur J. Hamon.

Procladius brevipetiolatus Goetghebuer

Trichotanypus brevipetiolatus Goetghebuer, 1935, *Rev. Zool. Bot. Afr.* **27** : 355.
Procladius brevipetiolatus Freeman, 1955, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 56.

Cilaos, 10 ♂, 5 ♀, 25.iv.56.

This is a widespread and common African mainland species and the present specimens are quite typical.

Metriocnemus wittei Freeman

Metriocnemus wittei Freeman, 1955, *Explor. Parc nat. Albert, Miss. de Witte*, fasc. **33** : 9 ; Freeman, 1956, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 295.

Bélouve, 18 ♂, 12 ♀, 1600 m., 23.iv.56.

The males are very similar indeed to African mainland specimens both in structure and colour, but in the females the thoracic stripes tend to be separated so that the shoulders and lines of the dorso-central bristles are brown or yellowish-brown. In my opinion this is not sufficient for specific separation.

Cricotopus rodriguensis Edwards

Cricotopus rodriguensis Edwards, 1923, *Ann. Mag. nat. Hist.* (9) **12** : 332 ; Freeman, 1956, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 306.

Cilaos, 2 ♂, 25.iv.56 ; St. Pierre, 1 ♂, 5.i.56 ; St. Denis, 1 ♂, 1.i.56.

These specimens only differ from the type series from Rodriguez by the rather darker femora. The species is not known from the African mainland.

Trichocladius micans Kieffer

Dactylocladius micans Kieffer, 1918, *Ann. Mus. nat. Hung.* **16** : 81.
Trichocladius micans Freeman, 1956, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 314.

Bélouve, 1 ♂, 23.iv.56.

The single male agrees very well with African mainland material; it is easily identified by the absence of pulvilli and anal point and by the silvery prothorax. The species is widespread in East and Southern Africa.

Cardiocladius latistilus Freeman

Cardiocladius latistilus Freeman, 1956, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 322.

St. Denis le Brulé, 6 ♂, 12 ♀, 22.iv.56.

This species is known from a few specimens from Natal and Transvaal and is distinguished from other African species by the grey pruinose rings at the apices of the abdominal segments and by the very broad male styles. M. Hamon's specimens agree very well with the type series and are an interesting new record for the species.

Smittia conigera Freeman

Pseudosmittia conigera Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 176.
Smittia conigera Freeman, 1956, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **4** : 351.

Bélouve, 33 ♂, 1600 m., 23.iv.56; Brulé de St. Paul, 2 ♂, 29.iv.56.

This series is exactly similar to mainland African species in colour and genital structure. The species is widespread in East and South Africa.

Chironomus (*Chironomus*) *transvaalensis* Kieffer

Chironomus transvaalensis Kieffer, 1923, *Ann. Soc. sci. Brux.* **42** (1) : 386; Freeman, 1957, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **5** : 339.

Cilaos, 8 ♂, 25.iv.56; St. Denis, 6 ♂, i–iv.56; Bois Rouge St. André, 12 ♂, 2 ♀, 21.iv.56.

This is a large and typical species of the genus with a wide distribution on the African mainland; it is most easily separated from other species of the genus by the strong, down-turned anal point.

Chironomus (*Chironomus*) *callichirus* Kieffer

Chironomus callichirus Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 352; Freeman, 1957, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **5** : 341.

Cilaos, 2 ♂, 4 ♀, 25.iv.56; St. Paul, 2 ♀; Bois Rouge St. André, 3 ♀, 21.iv.56; St. Denis, 10 ♀, 10.iv.56.

The type specimen of this species came from Seychelles, but it is common and widely distributed in many parts of Africa as well as being found in Madagascar. It can be separated from other species of the genus by the dark anterior knees and the well developed thoracic pruinosity.

Chironomus (*Chironomus*) *calipterus* Kieffer

Chironomus calipterus Kieffer, 1908, *Denkschr. Med.-Nat. Ges. Jena* **13** : 158; Freeman, 1957, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **5** : 343.

Cilaos, 1 ♀, 25.iv.56.

This species is readily recognised because of the faint spots on the wings.

It is found in most parts of Africa and has been recorded from Madagascar; the female from Réunion resembles other material I have examined.

Chironomus (*Dicrotendipes*) *binotatus* Kieffer

Chironomus binotatus Kieffer, 1911, *Trans. Linn. Soc. Lond.* (*Zool.*) **14** : 354; Freeman, 1957, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **5** : 367.

St. Pierre, 2 ♂, 5.i.56.

The type locality of this species is Seychelles and there is a further specimen in the British Museum from Portuguese East Africa. It is only slightly different from *C.* (*D.*) *chambiensis* Goetghebuer from Uganda and Belgian Congo, the main difference lying in the shape of the anal point which is longer and more curved in *binotatus*, whilst appendage 2 is less strongly clubbed.

Polypedilum (*Pentapedilum*) *anale* Freeman

Pentapedilum anale Freeman, 1954, *Proc. R. ent. Soc. Lond.* (B) **23** : 22.
Polypedilum (*Pentapedilum*) *anale* Freeman, 1958, *Bull. Brit. Mus.* (*nat. Hist.*) (*Ent.*) **6** (in the press).

St. Benoit, Pont Payet, 1 ♂, 4.ii.56.

This species is found in many parts of the African mainland and can be separated from other species by the stout anal point of the male and the reduced appendage 1; southern African specimens are darker than those from further north. The single male from Réunion is structurally similar to mainland specimens and in colour resembles the paler forms.

A NEW TERMITE FROM THE SOLOMON ISLANDS (ISOPTERA)

By W. Victor Harris
(*Colonial Termite Research Unit*)

In a large and varied collection of termites from the British Solomon Islands Protectorate, made by Mr. E. S. Brown during 1955–56, is a series which is placed in the genus *Schedorhinotermes* and described here as a new species. It was found only once, and in low montane forest on one of the few occasions when collecting was possible away from the coastal plains. All the ten species of termites previously recorded from the Solomon Islands (Harris, 1957) were collected by Mr. Brown, with one new record, *Termes odontomachus* Desneux, hitherto known only from New Guinea, and these will be discussed elsewhere (Harris and Brown).

The subfamily Rhinotermitinae is characterized by the development of the labrum of the soldier with a long median groove from the tip to the base, where it connects with a similar groove on the frons leading to the large fontanelle, the opening of the frontal gland. Other than in the genus *Parrhinotermes*, there are two very distinct soldier castes. The mandibles of the worker and imago castes show a primitive pattern of marginal teeth. *Schedorhinotermes* is numerically the largest genus in this subfamily and covers the African, Asian, Malayan and Australian Tropics from Senegal to the Phillipines. *Prorhinotermes* is found on islands in the Indian and Pacific Oceans and the Caribbean Sea, and less commonly on the adjacent mainland as in Formosa and Central America. *Parrhinotermes* is a small genus restricted to the Malayan Region and North Queensland. *Rhinotermes*, *Dolichorhinotermes* and *Acorhinotermes* are all from the American Tropics.

Schedorhinotermes browni sp.n.

Soldier.—Head a dull yellow colour, with a diffuse brown area immediately posterior to the fontanelle; labrum and mandibles brown; thorax, abdomen and legs pale yellow with numerous brownish-yellow bristles.

Head slightly ovoid, with lightly curved sides converging towards the anterior, and the posterior margin flatly rounded. Fontanelle conspicuous, at head of distinct groove leading to anterior margin of frons and continuing along the elongate, tongue-like labrum to the membranous tip. Mandibles robust with sharply incurved tips, the left with 2 prominent marginal teeth, the right with 1; both mandibles with the basal third of the inner margin distinctly serrated.

Pronotum small, more or less oval, with anterior and posterior margins slightly emarginate. Abdomen elongate with prominent anal cerci.

Only one form of soldier present in the series, and having the general characteristics of a "major" soldier in this genus.

	mm.
Length of head and mandibles	1·54–1·60
Length of head	1·00–1·04
Width of head	0·91
Length of left mandible	0·64
Width of pronotum	0·50–0·54
Length of pronotum	0·27–0·32
Length of hind tibia	0·73–0·77

Worker.—Head pale yellow, rather square-shaped with broadly rounded posterior; postclypeus short, lightly inflated; labrum short and broad with semicircular tip; mandibles strongly chitinised, as figured, with large basal lobe transversely corrugated on right mandible; antennae with 13 segments.

Body and legs pale and (in spirit) translucent, with numerous short bristles.

Width of head . . . . . 1·0 mm.

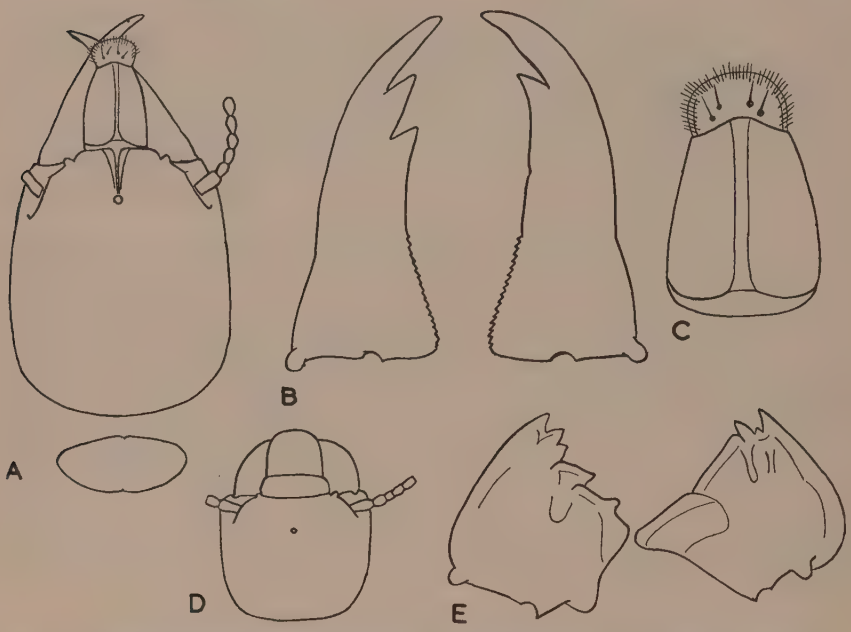


Fig. 1.—*Schedorhinotermes browni* sp. n. A–C, Soldier: (A) head and pronotum; (B) mandibles; (C) labrum. D–E, Worker: (D) head; (E) mandibles.

The soldiers differ from the major soldiers of other species of *Schedorhinotermes* known from the Papuan zone only in their distinctly smaller size, by their antennae having 13 segments as against 15 to 17, and by the anterior margin of the pronotum being an almost uniform curve and not in two projecting lobes.

Described from 12 soldiers and numerous workers.

Type locality.—British Solomon Islands Protectorate: Guadalcanal, Gold Ridge, 22.iii.1955, No. 2523. (*E. S. Brown*).

Holotype, soldier in the British Museum (Nat. Hist.).

References

Harris, W. V., 1957, Isoptera from Rennell Island. *Nat. Hist. Rennell Island, Copenhagen*, **2**: 25–30.

—— and Brown, E. S., 1958, The Termites of the British Solomon Islands. *Bull. ent. Res.* (in the press).

A BRITISH RECORD OF *DUSMETIA PULEX* (RUSCHKA) (CHALCIDOIDEA, ENCYRTIDAE)

By O. W. Richards

(*Imperial College of Science and Technology*)

In 1949, Dr. K. Boratynski bred some parasites from scale insects at the Imperial College Field Station which I identified as belonging to the genus *Dusmetia* Mercet, previously unrecorded as British. Mr. Kerrich agreed in the generic position but it seemed that the species was not the same as the type, *D. ceballosi* Mercet, 1921. Ferrière (1953) pointed out that *Blastothrix pulex* Ruschka, 1923, also belonged to *Dusmetia*.

Recently Dr. Max Beier of the Naturhistorisches Museum, Wien, was kind enough to lend me paratypes of Ruschka's species, and Dr. Ceballos of the Instituto español de Entomologia lent the type male and a female of Mercet's species. It is now possible to identify the British specimen with the former species and to point out how the two species differ. Both Mr. Kerrich and Mr. R. D. Eady have examined all the specimens and detected some of the points to which I am now calling attention.

The genus *Dusmetia* is rather easily recognised by its rudimentary wings, six funicular segments, large rounded scutellum, bidentate mandibles, reddish colour with white scale-like hairs and some of the antennal segments white. It probably belongs to the tribe Ectromini.

Separation of the Species

1 Antennae without the scape longer than the whole body, with long pubescence . . . . . ♂ 2

– Antennae without the scape not as long as whole body . . . . . ♀ 3

2 Antennal club not longer than funicle 5 + 6, segment 2 with distal half white. Wings much longer than broad, projecting a little beyond the scutellum . . . . . **D. ceballosi** Mercet

– Antennal club longer than funicle 5 + 6, segment 2 unicolorous. Wings not much longer than broad, not projecting beyond the scutellum . . . . . **D. pulex** (Ruschka)

3 Antenna with scape more rounded, not truncate at end; funicle with 4 + 5 + 6 white, 2 with distal half sharply white, funicular segments longer than broad. Wings more than twice as long as broad, end pointed . . . . . **D. ceballosi** Mercet

– Antenna with scape more lamellate, end truncate and clearly wider than the funicle; funicle with at least 4 + 5 and, in British species, also 6 brown, 2 with often more than distal half white; funicular segments wider, hardly longer than broad. Wings shorter and broader, not quite twice as long as broad, end rounded . . . **D. pulex** (Ruschka)

Specimens Examined

D. ceballosi Mercet, 1921 : 152, fig. 43 (♂).

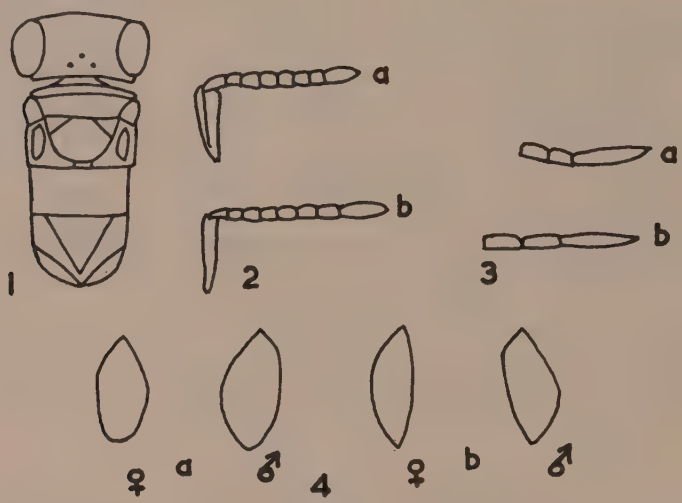
♂ type, Spain : Fuenterrabia ; ♀, Somosierra.

D. pulex (Ruschka).

Blastothrix pulex Ruschka, 1923 : 3.

Dusmetia pulex Ferrière, 1953 : 7, fig. 11.

Britain, Berks. : Silwood Park, ex *Ripersia* sp. on *Deschampsia caespitosa* (L.) Beauv., 17.vi. em. 24—30.vi.49, 2 ♂ 4 ♀ (*K. Boratynski*) ; ex *Heterococcus nudus* (Green) on *Holcus mollis* L., 4.viii em. 15.viii.1949, 3 ♀ (*K. Boratynski*). Lower Austria : co-types 3 ♀, Kirchstatten, Siegenfeld, Puchberg, vii–ix (*Ruschka*) (one Madrid, two Vienna) ; co-type and one other ♂, Kaltenleutgeben, Siegenfeld, Aug. (Vienna).



Figs. 1–4.—(1) Outline of *D. pulex* (Ruschka) ♀. (2) Female antenna : (*a*) *D. pulex* ; (*b*) *D. ceballosi* Mercet. (3) Club and last two flagellar segments in male : (*a*) *D. pulex* ; (*b*) *D. ceballosi*. (4) Left wing ; (*a*) *D. pulex* ♂, ♀ ; (*b*) *D. ceballosi* ♂, ♀.

The British specimens have the sixth flagellar segment black instead of white, but seem otherwise identical with *D. pulex*. The antennae bear setae which are especially conspicuous in the male, but, as they are gummed down in *D. ceballosi*, I have left them out in the figures.

References

Ferrière, C., 1953, Encyrtides paléarctiques (Hym. Chalcidoidea). *Mitt. schweiz. ent. Ges.* **27** : 1–45, 91 figs.

Mercet, R. G., 1921, *Fauna ibérica. Himénopteros Fam. Encirtidos.* Madrid.

Ruschka, F., 1923, Beiträge zur Kenntnis einigen Encyrtidengattungen (Hym. Chalcid.). *Verh. zool.-bot. Ges. Wien* **72** : 1–13.

A DESCRIPTION OF THE LARVA OF *TOXORHYNCHITES ERYTHRURUS* EDWARDS, WITH A NOTE ON THE LARVA OF *FICALBIA* (*MIMOMYIA*) *LACUSTRIS* EDWARDS FROM SOUTHERN NIGERIA (DIPTERA : CULICIDAE)

By Gordon Surtees

(*West African Council for Medical Research, Virus Research Unit, Lagos, Nigeria*)

Toxorhynchites erythrurus Edwards

Head.—Antennae smooth, with only a few setae; subterminal setae singly placed, unbranched, less than 4. Terminal setae short, papillae placed subapically. Head setae A, B and C unbranched, shorter than head; *c*, *d* and *e* inconspicuous. Mouth-parts typical of the genus. Mandibles with 2 large and 3 smaller teeth. Mentum broader than long with rounded forward edge bearing 3–4 short broad teeth on either side of central tooth. Mouth brushes unserrated, strongly chitinised.

Thorax.—All thoracic setae single, short, stout and coarsely plumose, mounted on chitinous plates.

Abdomen.—Pleural hairs of abdomen longer than those of thorax, 2-branched, plumose, arising from distinct chitinous plates. Siphonal, subsiphonal and anal tufts all single, short and coarsely plumose. Comb absent. Siphon short, strongly chitinized. Index between 1·2 and 1·5. Pecten absent. Single plumose subventral tuft. Upper caudal seta with 7–9 equal branches, lower with 6 equal branches. Setae of ventral brush plumose, with strongly chitinized bases. Anal segment completely sclerotized. Posterior margin of saddle bearing numerous short stout spines. Gills subequal, very short, rounded.

The larvae of this species were taken from bamboo stumps near Lagos.

Ficalbia (*Mimomyia*) *lacustris* Edwards

Hopkins (1952) describes this larva from specimens taken from Jinja, Entebbe and Komolo Swamp in Uganda, but it has not yet been described from Nigeria. Edwards (1941) records that the adults have been taken in the Belgian Congo at Stanleyville, in Chad Territory at Fort Lamy and in the Sudan at Thar Joth. The type in the British Museum is from Entebbe. In addition to the features described by Hopkins, the following observations may be made regarding the larvae of this species.

Head.—Seta A with 7–8 branches, B and C each with 4 branches.

Abdomen.—Spines of comb apically fringed, 20–25 spines present in the proximal row with 9–11 in the distal patch. Anal segment not completely sclerotized and posterior edge of saddle bears a row of short spines. Upper caudal seta with 8–9 branches, lower with 3 branches.

The larvae were taken from a freshwater swamp near Lagos, some being found among *Pistia*, others in short grass growing in shallow water near the swamp edge. They were in association with *F. mediolineata*, *Uranotaenia balfouri* and *U. mashonaensis*.

References.

Edwards, F. W., 1941, *Mosquitoes of the Ethiopian Region*, I. London. Brit. Mus. (Nat. Hist.).

Hopkins, G. H. E., 1952, *Mosquitoes of the Ethiopian Region*, III. London. Brit. Mus. (Nat. Hist.).

Book Notice

Insect Flight. By J. W. S. Pringle. Cambridge Monographs in Experimental Biology 9. 8vo. Cambridge (University Press), 1957. Pp. viii + 133, text illust. 15*s*.

This is the ninth volume to appear in the series of Monographs in Experimental Biology published by the Cambridge University Press.

It reviews the present state of our knowledge of insect flight in the light of the rapid development in methods of experimental analysis in recent years.

The results of these advances are discussed under five headings :—General anatomy of the wings and of a wing-bearing segment ; the form and mechanism of the wing beat ; the histology, physiology, and biochemistry of flight muscle ; aerodynamics ; nervous and sensory mechanisms.

The main text is followed by a very full list of references to relevant literature. An index of insects and an index of subjects complete the work.

THE IDENTITY OF THE SUGAR-CANE *PULVINARIA* (HEMIPTERA : COCCOIDEA) OF MAURITIUS, WITH NOTES ON ITS ECONOMIC IMPORTANCE

By Raymond Mamet

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I. Introduction

Two species of *Pulvinaria* have been recorded as occurring on sugar-cane in Mauritius, viz., *Pulvinaria iceryi* (Signoret)[1] and *P. elongata* Newstead.

I had the opportunity of studying the type of *P. elongata* in the British Museum (Natural History) and have reached the conclusion that the record of *P. elongata* from Mauritius should be considered as erroneous.

The paper which follows reviews the systematics of *P. iceryi* and mentions some of the economic aspects of this species under conditions prevailing in Mauritius. Descriptions of both *P. iceryi* and *P. elongata* are given and characters differentiating both species are also mentioned.

II. Acknowledgments

Thanks are due to the authorities of the British Museum (Natural History), especially to Mr. N. D. Riley and Mr. J. P. Doncaster, for the help kindly afforded to the author during his stay at the Museum.

The author is greatly indebted to Dr. H. K. Munro for the loan of type slides and unmounted type material of *Pulvinaria lepida* Brain and to Dr. W. J. Hall and Dr. D. J. Williams, who kindly made available material of *P. lepida* Brain from Southern Rhodesia.

The author also expresses his very sincere gratitude to his friend and colleague M. P. E. L. Viette of the Muséum National d'Histoire Naturelle, Paris, who very kindly supplied microfilms and other copies of various papers which have been of great help in this study. M. Viette has also kindly assisted the author in checking the quotations and dates mentioned in the paragraphs which deal with the nomenclature of *P. iceryi*.

Thanks are also due to Mr. S. Felix for the photographs accompanying this paper.

III. The "Types" of *Pulvinaria iceryi* (Signoret) and *P. elongata* Newstead

According to information obtained some years ago from the late E. E. Green, the "type" of *Pulvinaria iceryi* (Sign.) does not seem ever to have existed. From personal investigation, it appears that the original material of this species can no more be traced. It is therefore assumed that the "type" of *P. iceryi*, if it ever existed, is no longer available. The author proposes therefore

[1] *Pulvinaria iceryi* (Guérin-Méneville) = *P. gasteralpha* Signoret.

to designate a " neotype " for this species, which was originally described from sugar-cane in Mauritius.

The " types " of *Pulvinaria elongata* Newst., as well as part of the unmounted " type " material of this species, are in the British Museum (Natural History). Newstead's original preparations have now faded almost completely so that examination and study of minute and delicate structures, such as the ventral subcutaneous tubular ducts, are very difficult and almost impossible. I have therefore been privileged in securing part of this unmounted type material of *P. elongata* upon which the description of this species and the figures which accompany it have been based.

IV. The Mauritian Sugar-cane *Pulvinaria : P. iceryi* (Signoret)

After studying numerous specimens of *Pulvinaria* collected on sugar-cane at different dates and in various localities in Mauritius, the author considers that only one species of that genus occurs on that plant in this Island. This species cannot by any means be identified as *P. elongata* Newstead and is referred to *Pulvinaria iceryi* (Signoret) on the following grounds :

(1) The characters exhibited by the adult female agree quite well with those mentioned by Signoret in his original description of *Lecanium iceryi* (1869) and in that of his *Pulvinaria gasteralpha* (1873) (which name is known to be a synonym of the former).

(2) It is the only species of that genus known to occur in Mauritius on sugar-cane and other Gramineae.

(3) *Pulvinaria iceryi* (Signoret) was originally described from Mauritius (type locality) on sugar-cane (type host).

1. *A Point of Nomenclature*

Before entering into a purely taxonomic study of the species of *Pulvinaria* occurring on sugar-cane in Mauritius, a nomenclatorial problem concerning the synonymy and authorship of *P. iceryi* must first be elucidated.

In a paper entitled *Études sur les Insectes considérés comme la cause de la maladie des cannes à sucre dans les Îles Maurice et de la Réunion*, and communicated to the Société Entomologique de France at a meeting held on 22nd January, 1868 (1868, *Bull. Soc. ent. Fr.* : xiii), F. E. Guérin-Méneville (1869, *Ann. Soc. ent. Fr.* (4) **9** : 89–92 (23rd June)) listed (p. 92) all the insects designated under the name of " Pou à poche blanche " in these Islands. They were : " *Coccus sacchari* Guérin-Méneville " (now recognised as a synonym of *Icerya seychellarum* (Westwood)), " *Lecanium iceryi* Guérin-Méneville " with which he synonymised the " *Gasteralphe* " described by Dr. Icery (1864, *Mémoire sur le pou à poche blanche*, 8 pp.), " *Lecanium guerinii* Signoret " and " *Aleurodes bergii* Signoret " (now known as *Neomaskellia bergii* (Signoret)). It is here pointed out that no description of any kind accompanied the name " *Lecanium iceryi* Guérin-Méneville " as published by this author in the above-mentioned paper.

V. Signoret, at the same meeting of the Société Entomologique de France (22nd January, 1868) communicated (1868, *Bull. Soc. ent. Fr.* : xiii) a paper entitled : " Quelques observations sur les Cochenilles connues sous le nom de *Pou à poche blanche* qui ravagent les plantations de cannes à sucre à l'île Maurice

et à l'île de la Réunion ". This paper was published on pages 93–96 of the *Annales* of the Société Entomologique on 23rd June, 1869 (*Ann. Soc. ent. Fr.* (4) **9** : 93–96). In mentioning a paper previously published by Berg (1862, *Société Imperiale Zoologique d'Acclimatation* : 939–47), and entitled " Des insectes herbivores de l'Île de la Réunion et particulièrement de ceux qui envahissent la canne à sucre ", Signoret (*op. cit. supra* : 93) stated : " M. Berg, de l'île de la Réunion, dans les *Mémoires de la Société Imperiale de l'Agriculture*, **1862** : 939, décrit un *Coccus* veritable pour la femelle, c'est le *Coccus sacchari* Guérin que je décris plus loin " and he gave (*loc. cit. supra* : 94) the following bibliographic references to this species : " *Coccus sacchari* Guérin, *Rev. Zool.* Décembre 1867, partie du *Pou à poche blanche*.—Berg, mémoires cités, 1862, p. 939 ". The " pou à poche blanche " of Berg, as for the female, was therefore rightly considered by Signoret as a synonym of *Coccus sacchari* Guérin-Méneville, which is now known as *Icerya seychellarum* (Westwood). As for the " male insect ", Signoret stated (p. 94) that it rather belonged to a species of the genus *Aleurodes* which he had already described under the name of *Aleurodes bergi*. It follows therefore that Fernald (1903, *Catalogue of the Coccidae of the World :* 133) had erroneously entered Berg's " pou à poche blanche " as partly referring to the sugar-cane *Pulvinaria*. This entry should rather go under *Icerya seychellarum* (Westwood).

In the same paper, Signoret (pp. 95–96) cites " *Lecanium iceryi* mihi " and " *Gasteralphe*, Mém. sur le *Pou à poche blanche* du Docteur Icery (1854 : 8) " as belonging to the same species;[2] " *Lecanium guerinii* " without description or author's name, and " *Aleurodes bergi* Signoret, *Ann. Soc.*, 1868, p. 800 " as the insects found on sugar-cane in both Mauritius and Réunion Island. The description accompanying the name " *Lecanium iceryi* mihi " is the first, without any doubt, referable to the sugar-cane *Pulvinaria* of both Islands. It should, at this juncture, be stressed that Signoret clearly stated that he was himself the author of that name (*Lecanium iceryi* mihi).

Again in 1868, Guérin-Méneville (1868, *Rev. Mag. Zool.* (2) **20** : 123–7, meeting of March, 1868 ; and 1868, *Bull. Soc. Imp. Centr. Agric. Fr.* (3) **3**, 1867–68 : 245–8) in another paper bearing the same title as the one communicated to the Société Entomologique de France on 22nd January, 1868, and published on 23rd June, 1869, in the *Annales* of that Society (*op. cit. supra* : 89–92), again listed the insects designated under the name of " Pou à poche blanche " in Mauritius and Réunion Island but changed the name " *Lecanium iceryi* Guérin " to that of " *Gasteralphes iceryi* Signoret ", thus recognising Signoret as the author of the name " *iceryi* ". This change in author's name is of importance, since (as it can be inferred) Guérin-Méneville, in so doing, redressed an error he knew he had made at the meeting of the Société Entomologique held on 22nd January, 1868. In mentioning the name " *Gasteralphes iceryi* Signoret ", Guérin-Méneville elevated the " *Gasteralphe* " of Icery (1864, *loc. cit.*) to generic rank. But this name, as published by Icery, has no standing in nomenclature ; its author neither used the Binomial Nomenclature nor designated it as the *generic* name under which the insect attacking sugar-cane in Mauritius should be classified.

At the meeting of the Société Entomologique de France held on 25th March,

[2] The year of publication of Dr. Icery's *Mémoire sur le pou à poche blanche* is 1864 and not " 1854 " as stated by Signoret.

868,[3] Signoret (1869, *Ann. Soc. ent. Fr.* (4) **8** : 857) gave the following synonymy r the sugar-cane *Pulvinaria* known from Mauritius :

C[occus] Iceryi Guérin, *Soc. d'Acclim.* (1867).

Le pou à poche blanche A. Berg, *Soc. d'Acclim.* (1862), ix, 939.

Gasteralpha docteur Icery, *Mém. sur le Pou à poche blanche*, avec planches (1864) (le ♂ est un parasite), pl. 1, 2, 3 et 6, ♀.

L[ecanium] Iceryi Signoret, *Ann. Soc. Ent.* (1868).[4]

have been unable to find the description of *Coccus iceryi* " Guérin " in the olume of the Société Imperiale Zoologique d'Acclimatation for 1867. This ame was apparently never published. The name " *le pou à poche blanche* " as previously referred by Signoret at the meeting of the Société Entomologique e France held on 22nd January, 1868 (*see above*) to " *Coccus sacchari* Guérin ", known synonym of *Icerya seychellarum* (Westwood). " *Gasteralpha* " has, s mentioned above, no nomenclatorial standing. This leaves only " *Lecanium ceryi* Signoret " which should be considered as the then nomenclatorily correct ame of the sugar-cane *Pulvinaria* occurring in Mauritius and Réunion Island. ut this name was not accompanied by any description and should therefore e considered as a *nomen nudum.*

At the meeting of the Society held on 13th November, 1872 (1873, *Ann. oc. ent. Fr.* (5) **3** : 37, 10th August), Signoret gave a formal description of *Pulvinaria gasteralpha* Icery " " qui paraît faire beaucoup de dégâts aux lantations de cannes à sucre dans l'Île Maurice ". As this species was never amed as such by Icery in his *Mémoire sur le pou à poche blanche* (1864, *loc. cit.*), nd bearing in mind that the name " *gasteralphe* ", as used by Icery, has no omenclatorial status, it follows that Signoret should be attributed the author- hip of the name *Pulvinaria gasteralpha.*

In 1877, Signoret (1877, *Ann. Soc. ent. Fr.* 1876 (5) **6** : 667, 668) in the *Table Générale des Espèces* of his *Essai sur les Cochenilles*, mentioned both *Pulvinaria gasteralpha* Icery " (p. 667) and " *Pulvinaria Iceryi* Guérin- Méneville (= *gasteralpha*) " (p. 668). This last reference was meant to mean hat *Iceryi* was considered by Signoret as a synonym of *gasteralpha.* As has ust been pointed out, the author of *Pulvinaria gasteralpha* is Signoret and not cery, and that of *Lecanium iceryi*, which can undoubtedly be referred to the enus *Pulvinaria*, is Signoret and not Guérin-Méneville.

Under the Laws of Nomenclature, the name *Lecanium iceryi* Signoret 1869) (which is a synonym of *Pulvinaria iceryi* (Signoret)) takes precedence ver that of *Pulvinaria gasteralpha* Signoret (1873).

To sum up, the following conclusions are arrived at :

(1) The " *Pou à poche blanche* " of Berg (1862) should be referred to *Icerya eychellarum* (Westwood) (= *Coccus sacchari* Guérin-Méneville).

(2) Guérin-Méneville did not publish a description of " *Coccus iceryi* " in he volume for 1867 of the Société Imperiale Zoologique d'Acclimatation.

(3) The author of the name " *Lecanium iceryi* " mentioned by both Guérin- Méneville and Signoret is Signoret and not Guérin-Méneville.

(4) " *Gasteralphes iceryi* Signoret " is a *nomen nudum* and has, moreover, o standing in nomenclature.

[3] The date of this meeting, as published, is " 23rd March, 1868 ". This date has been rinted in error since the meeting was actually held on 25th March, 1868.

[4] This name was in fact published in 1869 and not in 1868.

(5) *Pulvinaria gasteralpha* Signoret (1873) is a synonym of *Pulvinaria iceryi* (Signoret) (1869).

(6) The sugar-cane *Pulvinaria* described from Mauritius should be known as *Pulvinaria iceryi* (Signoret).

2. *Pulvinaria iceryi* (Signoret). (Fig. 1, Pl. I, figs. 4, 5)

(Taxonomic references only)

1864, *Gasteralphe* Icery, *Mémoire sur le Pou à poche Blanche*, 8 pp. (no nomenclatorial status).
1868, *Gasteralphes iceryi* Signoret, Guérin-Méneville, *Rev. Mag. Zool.* (2) **20** : 123–7 (*nomen nudum* ; no nomenclatorial status).
1868, *G. iceryi* Signoret, Guérin-Méneville, *Bull. Soc. Imp. Centr. Agric. Fr.* 1867–68, (3) **3** : 245–8 (*nomen nudum* ; no nomenclatorial status).
1869, *Lecanium iceryi* Signoret, Signoret, *Ann. Soc. ent. Fr.* (4) **8** : 857 (*nomen nudum* ; synonymy given).
1869, *L. iceryi* Signoret (*nec* Guérin-Méneville), Guérin-Méneville, *Ibid.* (4) **9** : 92 (*nomen nudum*).
1869, *L. iceryi* Signoret, Signoret, *Ibid.* (4) **9** : 95 (description).
1869, *L. gasteralphe* Signoret (*nec* Icery), Signoret, *Ibid.* (4) **9** : 101 (*nomen nudum*).
1869, *Pulvinaria gasteralphe* Signoret (*nec* Icery), Signoret, *Ibid.* (4) **9** : 101 (*nomen nudum*).
1873, *P. gasteralpha* Signoret (*nec* Icery), Signoret, *Ibid.* (5) **3** : 37 (description).
1877, *P. gasteralpha* Signoret (*nec* Icery), Signoret, *Ibid.* (5) **6** : 667 (mention only).
1877, *P. iceryi* Signoret, Signoret, *Ibid.* (5) **6** : 668 (mention only ; as a synonym of *P. gasteralpha* Signoret).
1896, *P. gasteralpha* Signoret, Cockerell, *Check List* : 330.
1903, *P. iceryi* Signoret (*nec* Guérin-Méneville), Fernald, *Cat. Cocc. World* : 133.
1920, *P. lepida* Brain, *Bull. ent. Res.* **11** : 20 (**syn. nov.**).
1932, *P. lepida* Brain, Hall, *Stylops* **1** : 190.
1949, *P. elongata* Newstead, Mamet, *Bull. Maur. Inst.* **3** : 27 (misidentification).
1949, *P. iceryi* Signoret (*nec* Guérin-Méneville), Mamet, *Ibid.* **3** : 27.
1949, *P. lepida* Brain, Mamet, *Ibid.* **3** : 28 (misidentification).

Hosts and distribution.—Originally described from sugar-cane from the Islands of Mauritius and Réunion. The following specimens were examined during the course of this study :

Mauritius : Pamplemousses, on sugar-cane, x.1914 (*de Charmoy*) ; locality unknown, on sugar-cane, 1915 (*de Charmoy*) ; Réduit, on sugar-cane, 8.v.1941 (*Ray. Mamet*) ; Réduit, on sugar-cane, 1954 (*Ray. Mamet*) ; Pamplemousses (Mon Goût), on sugar-cane, ix.1955 (*Ray. Mamet*) ; Notre Dame, on sugar-cane, x.1955 (*Ray. Mamet*) ; Flacq (Constance), on sugar-cane, x.1955 (*J. R. Williams*) ; Trou aux Biches, on *Cynodon dactylon* (Linn.) Pers., 23.viii.1955 (*Ray. Mamet*) ; Pamplemousses (Mon Goût) on *Cynodon dactylon* (Linn.), Pers., ix.1955 (*Ray. Mamet*) ; Pamplemousses (Mon Goût), on *Paspalidium geminatum* (Forsk.) Stapf., ix.1955 (*Ray. Mamet*).

Réunion Island : On sugar-cane, 1955 (*J. R. Williams*).

Agalega Island : South Island : on *Digitaria didactyla* Willd., 15.v.1955 (*Ray. Mamet*) ; on *Panicum maximum* Jacq., 16.v.1955 (*Ray. Mamet*) ; on undetermined gramineous weed, 18.v.1955 (*Ray. Mamet*).

South Africa : Standerton, on grass, 18.ii.1906, No. Tr. 1035 (ex. coll. C. K. Brain No. 139, in coll. Dept. Agric. Pretoria, South Africa) ; Pretoria, Muckleneut, on grass, ii.1917 (*H. K. Munro*) (ex. coll. C. K. Brain No. 328, in coll. Dept. Agric., Pretoria, South Africa).

Southern Rhodesia: Salisbury, on grass, 11.i.1918 (ex. coll. Dept. Agric. Salisbury, in coll. W. J. Hall); R. Makabusi, on grass, iv.1927 (*F. Eyles*) (ex. coll. W. J. Hall); Salisbury, on grass, 2.iii.1928 (*W. J. Hall*) (ex. coll. W. J. Hall).

Habit.—Occurring mainly on upper and lower surfaces of leaves of hosts.

Adult female extremely elongate or elliptical, extremities more or less equally attenuated, dorsum convex and shiny; cephalic region flattened in mature females; eyes black, fringed by white glassy filaments. Before production of ovisac, female more or less membranous and its coloration varies from pale straw-colour to pale brownish-yellow; submarginal and submedian areas speckled with greyish, blackish or deep bordeaux-red or violet spots which sometimes occur in patches especially in submedian zone; these spots absent from the broad median area which is straw-coloured. Beginning of formation of ovisac marked by appearance all round the female of pure white secretionary matter on which the female rests. At oviposition time, female becomes darker throughout and is more sclerotised; posterior extremity transversely ridged, tilted upwards and rests on waxy secretions forming the ovisac. Length of largest specimen examined (on slide), 5·0 mm.

Ovisac well developed, sometimes longer than the insect, pure white in colour, with very feebly marked carinae; extending anteriorly to about region of eyes. Venter of female before oviposition membranous but afterwards becoming somewhat sclerotised.

Recognition characters.—Derm of dorsum a little sclerotised at maturity, structureless except for perhaps 10–15 small, round disc pores with granular centres which lie along median line just anterior to anal plates, for fairly numerous, very small, pointed, lanceolate setae which seem to occur in well-defined series on different segments of body and for fairly numerous, small, clear, roundish pores scattered throughout. Derm of venter membranous in young individuals but becoming slightly sclerotised after oviposition. Eye spots small, submarginal.

Anal plates fairly large with posterior lateral margins as long as or a little longer than anterior lateral margins, either straight or slightly rounded; ventrally with 3 slender submarginal setae and 2 fringe setae on each side.

Marginal setae moderately stout, elongate, straight, acutely pointed, fairly evenly distributed; stigmatic depression slight; stigmatic spines well developed, in threes; median spine stouter than the others, very long, about 3 times length of lateral spines, curved at apical extremity; lateral spines short; submarginal tubercles not found.

Venter of abdomen with numerous multilocular pores around vulva, such pores occur in small numbers in median and submedian regions of all other abdominal segments, but are entirely absent from thoracic segments. Tubular ducts abundant, more crowded on abdominal segments than on rest of venter; occurring as follows: in a broad submarginal band on abdomen and thorax, in a much less crowded manner on submarginal area of head, in well-defined series which are continuous with submarginal band on all thoracic and abdominal segments. Very minute pores with sclerotised rim and peculiar subcutaneous ducts occur mostly intermingled with tubular ducts except for small areas on thorax; they are absent from the marginal area; a single row of very slender setae, much shorter and more slender than marginal setae, occurs towards margin of ventral derm.

Antennae 8-segmented, rather stout. Legs normally developed, with movable tibio-tarsal articulation; tarsus with the usual articulatory sclerosis.

Notes.—Type specimens as well as unmounted specimens from the type material of *Pulvinaria lepida* Brain were kindly made available by Dr. H. K. Munro. After carefully comparing these with material of *P. iceryi* from Mauritius, the author is of the opinion that both species are identical. *P. lepida* Brain should therefore be regarded as a synonym of *P. iceryi* (Signoret) (**syn.**

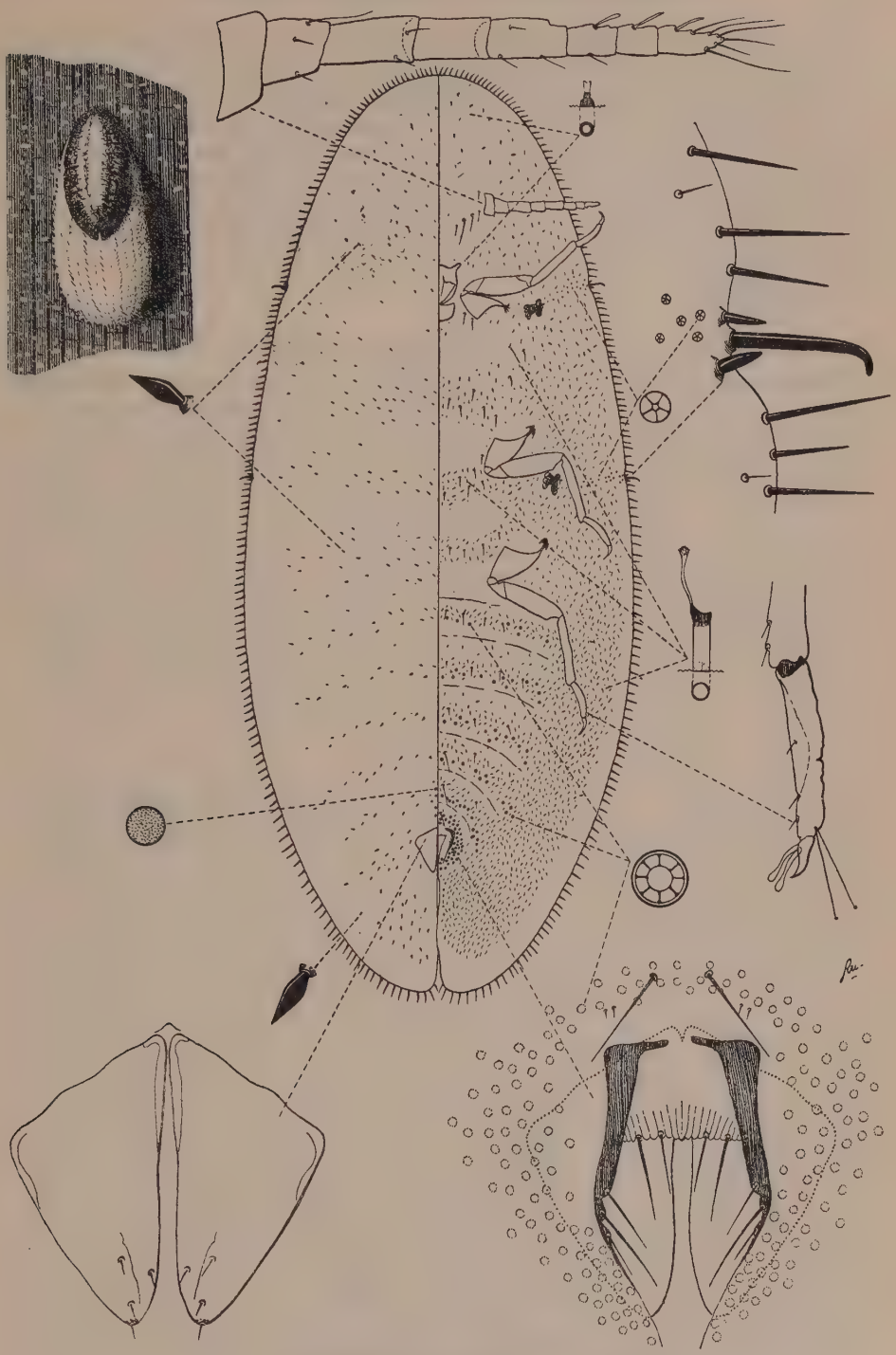

FIG. 1.—*Pulvinaria iceryi* (Signoret) : adult female.

nov.). Material of *Pulvinaria lepida* Brain (*det.* W. J. Hall) from Southern Rhodesia, kindly made available by Dr. W. J. Hall and Dr. D. J. Williams, was found to agree very closely with Mauritian examples of *P. iceryi* (Sign.).

As it appears that the " type " of *Pulvinaria iceryi* (Signoret) is now non-existent, a preparation, labelled " Neotype ", and bearing the following data : " *Pulvinaria iceryi* (Sign.), MAURITIUS: Réduit, on sugar-cane, 1954, coll. Ray. Mamet.", has therefore been selected by the author from among the specimens upon which the above description and the figures which accompany it were based. This " neotype " has been deposited in the British Museum (Natural History).

3. *Economic Aspects of* Pulvinaria iceryi (*Signoret*) *in Mauritius*

The most important outbreak of *Pulvinaria iceryi* (Signoret) in Mauritius occurred about a century ago when a Committee under the Chairmanship of Dr. E. Icery was appointed by the Chamber of Agriculture to investigate the matter. Their report is embodied in Dr. Icery's *Rapport sur le Pou à poche Blanche* (1864), in which it was made clear that this "... formidable ennemi ... a causé, en maintes localités, de grands dégâts et un mal de longtemps irréparable." No other major attacks of *Pulvinaria* have been reported as causing serious harm to this plant in Mauritius. In the light of present knowledge of the behaviour of our sugar-cane *Pulvinaria*, it seems that one of the hymenopterous parasites which was misidentified by Icery (*op. cit.*) as the male of the " pou à poche blanche ", was the principal, but then ignored, agent in the control of this scale. It appears that, through its constant beneficial action, this parasite has since spared much anxiety to the sugar-cane planters.

Pulvinaria iceryi is now considered a sugar-cane pest of very minor importance in Mauritius. It generally occurs as a few individuals, though minor sporadic outbreaks are sometimes observed. For instance, late in 1955, two small outbreaks occurred after a severe drought in the north of the Island (Mon Goût and Notre Dame). The attacks started in isolated spots in September–October[5] and by the end of December they had spread over 3 and 25 arpents of young cane plants respectively. The cane stools which had suffered the primary attacks died (Pl. I, fig. 2) and the adjoining plants were stunted in their growth. The leaves of the infested cane plants showed a characteristic yellowish, bordeaux-red or violet coloration before drying up. Insect colonies of varying importance (Pl. I, figs. 1, 3) could then be found on nearly all plants. They were attended by the ants *Solenopsis geminata* F., *Anoplolepis longipes* Jerd. and *Pheidole megacephala* F., which were feeding on the large amount of honey-dew secreted by the scale. It was noticed that these ants played an important role in the dissemination of the scale ; by the end of December it was found that the female and male *Pulvinaria* were very severely attacked by three species of Microhymenoptera : *Metaphycus* sp. (Encyrtidae), *Tetrastichus ceroplastae* How. (Eulophidae) and *Aneuristes ceroplastae* Grlt. (Aphelinidae) and by the Coccinellids, *Pullus pallidicornis* Muls. and *Hyperaspis hottentota* Muls. As much as 85–88 per

[5] The complete life cycle (egg to egg) of *P. iceryi* was found to occupy about 48 days (under insectary conditions at about 30° C.) ; the number of eggs laid by one female averaged about 95.

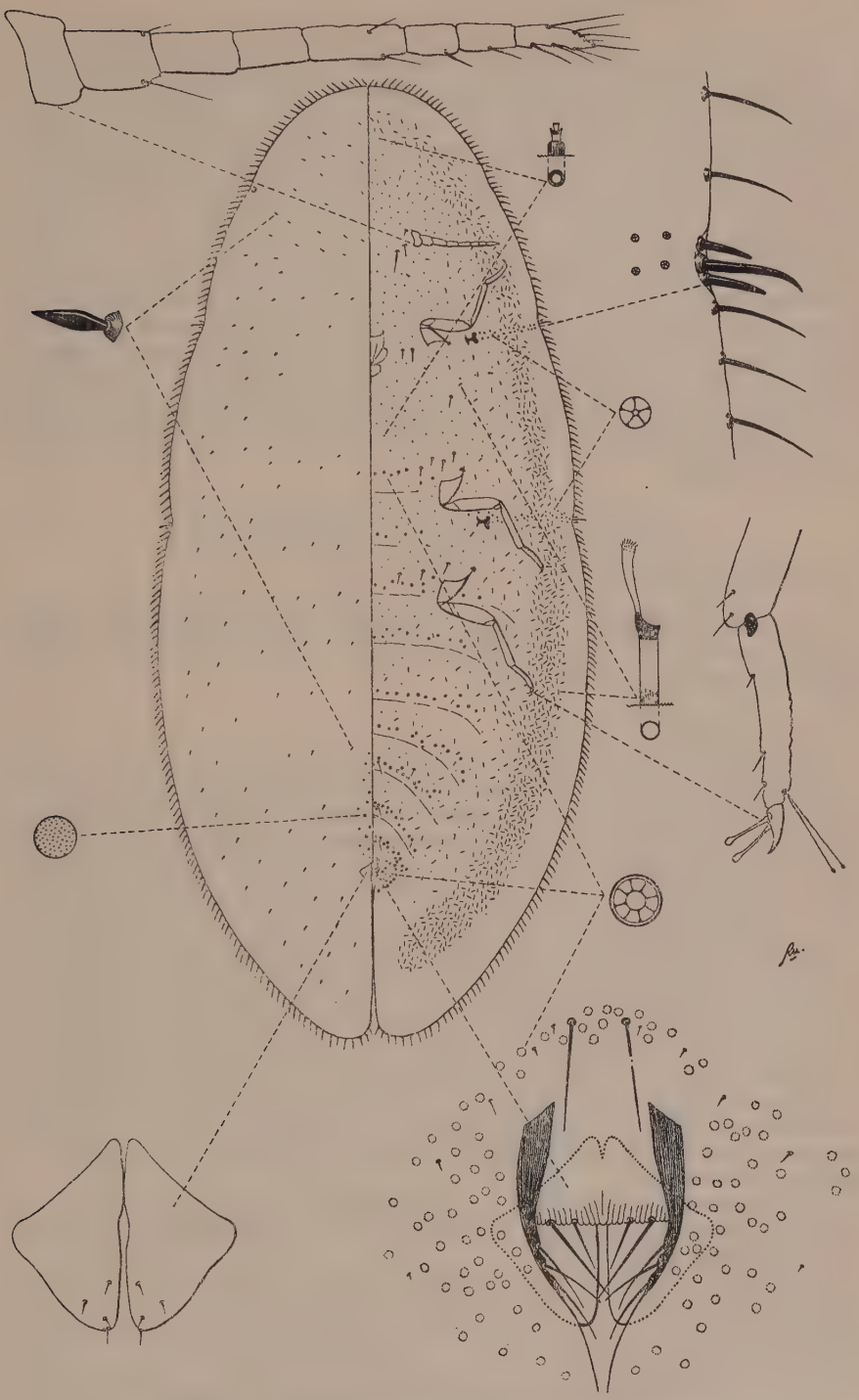

FIG. 2.—*Pulvinaria elongata* Newstead : adult female.

cent. of the female scales were at that time parasitised and as many as four or five parasite exit-holes could quite commonly be counted per female scale. The Coccinellid predators lived mostly on the eggs and first-stage larvae still enclosed in the ovisac of the Coccid. The scale attack subsided at the end of January ; this was mainly because of the beneficial action of the parasites. At crop season July–August, 1956, the average yield of the fields which had been attacked by *Pulvinaria* did not show any marked decrease when compared to that of adjoining fields.

The rare outbreaks of *Pulvinaria* on cane probably start when the parasite population is at a very low level, probably as a result of some adverse climatic factors which, on the other hand, favour the intense development of the scale population ; drought or severe dryness may be one of these factors. It should, in this connection, be noted that nearly all the reported outbreaks of *Pulvinaria*, whether large or small, have always occurred in the north of the Island, where dry conditions are more prevalent, rather than in the rest of the sugar-cane areas of Mauritius.

4. *A Redescription of* Pulvinaria elongata *Newstead*

1917, *Pulvinaria elongata* Newstead, *Bull. ent. Res.* **8** : 20.

Host and distribution.—Originally described from sugar-cane, British Guiana : Georgetown, 12.ii.1913 (*G. E. Bodkin*), No. D.625 (3/99). Type in British Museum (Natural History).

Habit.—Occurring on leaves of host.

Adult female described by Newstead (*loc. cit.*) as " extremely elongate or elliptical, extremities more or less equally attenuated ; dorsum convex, cephalic region flattened. Colour, in life, varying from very pale crimson to bright rosy flesh-colour, with two more or less distinct, longitudinal lines of bright crimson, the latter frequently interrupted by a black wavy loop-like line, due apparently to a portion of the alimentary tract (? Malpighian tubules). Dry cabinet specimens are pale buff, with a broad median suffused area of smoky-brown or red-brown, and often with a well-defined median keel. The ovisac is very short indeed, projecting but slightly beyond the margin ; it extends anteriorly, usually as far as the region of the eyes." Length of largest available specimen, on slide, about 5·5 mm.

Recognition characters.—Adult female : Derm of dorsum slightly sclerotised at maturity ; structureless except for perhaps 25–35 small round disc pores with granular centres which lie along median line just anterior to anal plates ; fairly numerous, very small, lanceolate, pointed setae which seem to occur in well-defined single rows on median area of thoracic and abdominal segments and in unevenly scattered series in anterior, posterior and submarginal areas of body ; and fairly numerous, small, roundish pores. Derm of venter membranous in young females but becoming slightly sclerotised after oviposition. Eye spots small, submarginal.

Anal plates small, roughly quadrate ; posterior lateral margins a little sinuate, about as long as anterior lateral margins ; ventrally with 3 slender subapical setae and 2 fairly developed fringe setae on each side.

Marginal setae moderately stout, elongate, a little curved, acutely pointed, evenly distributed ; stigmatic depression slight ; stigmatic spines well developed, stout, in threes ; median spine about twice as long as lateral spines, slightly curved towards apical end ; submarginal tubercles not found.

Venter of abdomen with numerous multilocular pores around vulva ; multilocular pores occur in rows in median and submedian areas of all other abdominal segments and

Pulvinaria iceryi (Signoret).

R. Mamet.

Adlard & Son, Ltd., Dorking.

of mesothorax and metathorax. Some of the pores occurring on thoracic segments smaller than those occurring elsewhere and with 5 loculi. Tubular ducts occurring in a narrow and well-defined submarginal band which is interrupted for a short distance near posterior apex of body ; these ducts more abundant on thorax and abdomen than on head ; similar ducts occur over the whole derm in much fewer numbers in a submedian series which is continuous with submarginal band, and in very few numbers in median area of the 4 segments situated just anterior to vulva ; almost entirely absent in the median areas of thorax and first abdominal segment. Very minute pores with sclerotised rims and peculiar subcutaneous ducts occur throughout area enclosed by submarginal band of tubular ducts.

Antennae 7- to 8-segmented, rather stout. Legs well developed, but somewhat slender, with movable tibio-tarsal articulation ; tarsus with a small articulatory sclerosis. The 5-locular pores accompanying posterior spiracles extending in a single row from spiracle towards median area of body to a little past the spiracle.

Notes.—This species differs from *Pulvinaria iceryi* by the very short ovisac which projects but slightly beyond the margin of the body, the occurrence of multilocular pores in the mid-region of the mesothorax and metathorax, the absence of tubular ducts in the median areas of thorax and first abdominal segments, the well-defined submarginal band of tubular ducts, the smaller anal plates and smaller legs, and the more numerous dorsal disc pores.

The above description and the accompanying figures are based upon specimens from Newstead's " type " material kindly made available by the British Museum (Natural History).

PLATE I

Pulvinaria iceryi (Signoret)

Fig. 1.—Colonies on leaves of a sugar-cane plant.
Fig. 2.—Sugar-cane plant dying through an attack.
Fig. 3.—Colonies near the bases of leaves of sugar-cane.
Fig. 4.—Females before secretion of ovisac (× about 2·5).
Fig. 5.—Adult females (× about 2).

A REVISION OF *PARAËDES* EDWARDS AND *CANCRAËDES* EDWARDS (DIPTERA : CULICIDAE)

By P. F. Mattingly

(*British Museum (Natural History)*)

Paraëdes was originally described by Edwards (*in* Barraud, 1934 : 446) as a distinct genus. His description was based on four specimens, two males of one species (*P. barraudi* Edwards, the type species of the genus) and two females of another (*P. argyrurus* Edwards). These species were associated by him mainly because they both lacked a fringe on the squama. Since that time the male of *P. argyrurus* has been found and, because its terminalia are quite unlike those of *P. barraudi*, it has been placed in a new subgenus, *Udaya* Thurman (1954 : 83). Even more recently I have received two new species of *Paraëdes* from Malaya, one of them very close to *P. barraudi*.[1] These species are known from both sexes of adult and also from the early stages and it transpires that the squamal fringe is suppressed only in the male and is well developed in the female. The same form of dimorphism is also exhibited by *Aëdes* subgenus *Cancraëdes*. There is thus no longer any reason for associating *Paraëdes* with *Udaya* and I have therefore proposed that the latter should be treated as a distinct genus (Mattingly, 1958*a*). Further evidence has now confirmed this (*see below*). At the same time I have transferred *Paraëdes* to the genus *Aëdes* and reduced it to subgeneric rank. Finally I have transferred to it *Aëdes ostentatio* Leicester, long treated as a *species incertae sedis* but, in fact, a perfectly typical *Paraëdes*, and also *Aëdes pagei* which has hitherto been placed in the synonymy of *Aë. ostentatio* but is in fact quite a distinct species. Much of the confusion relating to this group has arisen from the fact that most of the species involved appear to exhibit a very high degree of sexual dimorphism. I have been particularly fortunate in being able to prove this beyond doubt by means of specimens of both sexes from a single egg batch laid in the laboratory at the Institute for Medical Research, Kuala Lumpur and kindly sent me from there. The sexual dimorphism exhibited by the new species described below is of a precisely similar kind to that exhibited by the Malayan species in question. The other Malayan species differs from all other species in the group in a number of important respects and I have therefore placed it in a distinct species group (Group B). The object of the following description is to complete the revision of *Paraëdes*. A brief diagnostic description of the latter follows. For a fuller description and discussion *see* Mattingly (1958*a*).

Genus *Aëdes* Meigen

Subgenus *Paraëdes* Edwards

Type species : *Aë. barraudi* Edwards.

Adult female with scutum (except in one species) brightly ornamented with golden markings on a dark ground. Lower mesepimeral bristles absent. Tarsi dark. Squama with

[1] Since going to press this number has been increased to three, but the third species is still known from only one female adult and will not be described until more material is available.

well developed fringe. Sixth wing vein ending well beyond the base of the fork of the fifth. Pleural scale patches well developed. Fore tibial claw well developed. Spermatheca single. Adult male with palps very short, squama bare, scutum without conspicuous ornamentation (except in *Aë. barraudi* which has some white scaling). Terminalia with style bifid, one or both arms being crested as in many *Culex*, or trifid and without crest. Basal lobe of coxite with 3–4 apical or subapical modified setae, one or, more usually, all of which have the form of a flattened leaflet (fig. 1). Harpago very long and slender with two or more spines at tip. Phallosome with lateral plates smooth or unidentate. Pupa with trumpets short, not greatly expanded at apex. Float hair well developed. Seta 7 on segment VII slender and inconspicuous, on VIII somewhat thickened, single or bifid. Paddles ovate with edges very lightly serrated. Apical paddle seta short, unbranched. Larva with antenna short, spiculate. Mouth brushes without pectinate setae. Head setae A, B and C shorter than the head, with several plumose branches, *d* minute. Comb of a double row of spines with delicate lateral fringe and hypertrophied median denticle. Siphon short, slender with acus well developed. Pecten of slender, curved spines with small basal denticles, the most distal more widely spaced than the others. Subventral tuft very small and inconspicuous, arising beyond the distal pecten tooth. Saddle incomplete. Ventral brush with 4 pairs of large multibranched setae in the barred area; 1–2 small precratal setae usually also present. Anal papillae long or moderately long, pointed at tip.

Adults of at least some species bite man in forest. Breeding places are crab holes, ground pools, Nipah palm fronds.

Distribution.—India, Ceylon, Malaya, Sumatra, Java, Sarawak, Tarakan, Phillippines, ? Dutch Borneo, ? Indochina, ? Ceram.

Aëdes (Paraëdes) menoni sp. n.

Types.—Holotype ♂, with terminalia on slide, SW. India: Travancore (*M. O. T. Iyengar*); allotype ♀ with identical data. Both in British Museum (Nat. Hist.).

This species is named after Mr. M. A. U. Menon in recognition of his valuable studies of Travancore (and other) mosquitoes. The description which follows is based on the holotype and allotype and two female paratypes with the same data. All four specimens are in the British Museum. These specimens were sent to Edwards by Dr. Puri in December, 1935. Edwards noted the resemblance of the female to *Aë. ostentatio* and of the male to *P. barraudi* but was unwilling to commit himself further.

Adult ♀.—Wing length a little under 2·5 mm. Palps and proboscis dark. Proboscis about equal in length to front femur. Palps about one fifth length of proboscis. Vertex with submedian scales broad and dark, those at the extreme sides similar but paler, a broad median patch of narrow golden scales extending forward between the eyes which are narrowly separated. A line of narrow golden scales round the eye margins. Some pale, narrow upright scales on nape. Antenna of normal type, tori with a few small dark scales on inner face. Anterior pronotal lobes with narrow golden scales and golden bristles, a few narrow dark scales posteriorly. Posterior pronotum with narrow golden and dark brown scales. Scutum with narrow golden scales forming a well marked pattern on a dark ground, comprising a narrow band round the anterior margin which broadens and curves inwards in front of the scutal angle and continues for a short distance posteriorly, a large patch over the wing root and a broad median longitudinal line at least on the posterior half (rubbed anteriorly). Scutellum apparently with narrow golden scales on all lobes. Postnotum bare, dark. Sternopleura with well developed upper and lower posterior scale patches. Mesepi-

meron with a large scale patch. Alula with a few narrow fringe scales. Squama with fringe short and rather scanty. Scales of wing field relatively broad. Anterior fork cell less than half as long again as its stem. Haltere with knob dark and stem pale. Legs dark. Hind femur indefinitely pale below on about basal two-thirds of anterior surface, dark above to base. All femora narrowly pale at tip, tibiae dark. Fore tibial claw well developed. Fore tarsal claws simple. Abdominal tergites, posterior to the first, with broad yellowish basal pale bands, sternites pale basally, dark apically, the second apparently all pale. Cerci narrow, postgenital plate deeply emarginate. Ninth tergite longer than broad, bilobed, each lobe with 4–6 setae. Spermatheca triple. Insula poorly differentiated. Membrane of posterior wall of atrium thickened to form a poorly differentiated post-atrial apparatus, as in *Cancraëdes* (*see* fig. 2, p. 81, and Mattingly, 1958*a*).

FIG. 1.—Male terminalia. (*a*) *Aë.* (*Paraëdes*) *barraudi*. (*b*) *Aë.* (*Paraëdes*) *menoni* sp. n. *b.l.*, basal lobe of coxite ; *h*, harpago ; *pa*, paramere ; *ph*, phallosome ; *pt*, paraproct ; *st*, style ; *IXs*, ninth sternite ; *IXt*, ninth tergite.

Adult ♂.—Antenna only lightly plumose with about half a dozen long hairs in each verticillary whorl. Palps minute, much shorter than in female. Scales of vertex apparently all broad and dark except for some narrow golden ones round the eye margins and between the eyes and some pale broad ones at the sides. Anterior pronotal lobes with broad dark scales posteriorly, rubbed in front. Scutal scales apparently all dark except for a few whitish ones on anterior margin. Scutellum largely rubbed, the remaining scales dark. Fore tarsal claws simple. Femora apparently entirely dark. Squama bare. Anterior fork cell only slightly longer than its stem. First two abdominal tergites entirely dark, remainder missing. As already noted these differences from the female, although very great, are paralleled by those exhibited by sons and daughters of the same mother of one of my new Malayan

species. I do not doubt, therefore, that the sexes are correctly associated. *Terminalia* (fig. 1*b*). The available specimen is mounted on a slide and in poor condition, though obviously very different from the terminalia of any other known species. I have therefore figured them only in part beside a figure of those of *Aë.* (*P.*) *barraudi* for comparison. The style is bifid and the two arms are both crested but they are of quite different shape from those of *P. barraudi*. The basal lobe of the coxite somewhat resembles that of the new Malayan species but is quite different from that of *Aë. barraudi* since it lacks the inner arm. The modified setae at the tip are, however, similar in the two species. The harpago is more like that of *Aë. barraudi* than that of the Malayan species but differs from the former in being less strongly recurved and having the terminal setae more attenuated and not hooked at the tip. The phallosome differs from that of *Aë. barraudi* and resembles that of the Malayan species in having a stout, forwardly directed tooth at the tip of each lateral plate. The ninth tergite and sternite are apparently similar to those of *Aë. barraudi*.

Early stages and breeding places.—Unknown.
Distribution.—SW. India : Travancore.

Genus *Udaya* Thurman

Paraëdes subgenus *Udaya* Thurman, 1954 *Mosquito News* **14** : 83.
Paraëdes Edwards, 1934, *in* Barraud, *Faun. Brit. Ind.* (*Diptera*) **5** : 448 (*partim, P. argyrurus* Edwards only).
Udaya Thurman of Mattingly, 1958, *Cul. Mosq. Indomalayan Area* **3**.

Type species : *U. argyrurus* Edwards.

As noted above, *Udaya argyrurus* was grouped by Edwards with *Paraëdes barraudi* on the assumption that both lacked a fringe on the squama in both sexes. The discovery of the male of *U. argyrurus* seemed to confirm this, but its terminalia were so unlike those of *Paraëdes* that Thurman placed it in a separate subgenus. When females of *Paraëdes* were discovered they proved to have the squama fringed and I therefore transferred this group to *Aëdes* (Mattingly, 1958*a*). I have now received a new species of *Udaya* from Malaya. A joint description of this with Mr. Macdonald of the Institute of Medical Research, Kuala Lumpur, is in preparation. Early stages of both species have been obtained from gravid females in the laboratory. The new species has several long narrow scales on the squama of the female and there is a single scale of this kind to be seen on the squama of one wing of one of the two female cotypes of *U. argyrurus* (a lectotype designation is in the press). After carefully examining both species I have no doubt that in both there is, at least in the female, a squamal fringe consisting of several long, narrow, loosely attached scales. That these were missing from nearly all the specimens so far captured seems to be due to the fact that the very great lateral compression of the thorax brings the squamata into unusually close proximity to the lateral lobes of the scutellum.

Examination of the early stages has confirmed the impression gained from the adults that this is quite a distinct genus related to *Eretmapodites* Theobald. The breeding places of *Udaya* are unknown but the compression of the thorax suggests that they may well be bored bamboos. They are unlikely to be found very far from where the adults are taken since the latter do not give the impression of being strong fliers.

Genus *Aëdes* Meigen

Subgenus *Cancraëdes* Edwards

Aëdes subgenus *Cancraëdes* Edwards, 1929, *Bull. ent. Res.* **20** : 342, and 1932, *Genera Insectorum*, Fasc. **194** : 177.

Type species *Aëdes cancricomes* Edwards.

In the course of a revision of the Indomalayan species of this subgenus (Mattingly, 1958*a*) my attention was drawn by Dr. Donald Colless to discrepancies between the figure of the terminalia of the holotype male, published by Edwards (1928 : 273, fig. 1*e*) and those of a male from the Andaman Is. published by Barraud (1934 : 297, fig. 73*c*, *d*). On examining the specimen in the British Museum from which Barraud seems to have taken his figure I found that this is indeed very different from *Aë. simplex*. So far as I have been able to ascertain the latter is confined to Ceylon and records from elsewhere (Brug and Bonne-Wepster, 1947 : 185) are probably all in error. From Barraud's figure and from a superficial examination of the specimen (a poor one) it seemed that this might belong to a distinct species and I therefore provisionally treated it as such. Further dissection and remounting have, however, shown it to be a specimen of *Aë. cancricomes*, the type series of which also came from the Andamans. The reasons for Barraud's misidentification appear to be as follows.

(1) The terminalia were insufficiently macerated, greatly overstained and incompletely dissected. This probably led to certain fine leaflets at the base of the subapical lobe of the coxite being overlooked (*see* fig. 3, p. 82).

(2) Several of the principal setae were either broken or missing. In particular the large spine at the apex of the coxite was missing on both sides.

(3) Barraud attached too much importance to the pigmentation of the pleurae. This is a dangerous character in mosquitoes and, while it has a limited usefulness in *Cancraëdes*, it requires to be used with great caution (*see* Mattingly, 1958).

(4) The antennae of Barraud's specimen are missing and he seems to have borrowed his description of these from Theobald's description of the type of *Aë. simplex*.

(5) Barraud attached great importance to the fact that the abdominal tergites showed no basal pale markings. These are, however, always suppressed in the male of *Cancraëdes*, although present in the female.

(6) Barraud had no male of *Aë. cancricomes* for comparison. His males of this species were sent to Edwards in connection with an earlier paper (Edwards, 1922) and Barraud's own figure of this species (Barraud, 1934 : 297, fig. 73*b*) is a copy of Edwards' (Edwards, 1922, Pl. V, figs. 34, 35).

It appears to me that there is no reason to suppose that any species of this subgenus other than *Aë. cancricomes* occurs in the Andamans.

In view of the confusion which has occurred it has seemed best to redescribe the male of *Aë. cancricomes* and to figure the terminalia in more detail. The revision of *Cancraëdes* has, however, revealed so many interesting new subgeneric characters that a brief resumé of these is given first. The most interesting of them is, perhaps, the shortening of vein 6, the tip of which reaches the wing margin more or less level with the base of the fork of vein 5 in nearly all the species of the subgenus. This has previously been thought to be characteristic of *Uranotaenia* and certain other genera and has even been proposed as a tribal character. It has not previously been noted in *Aëdes*. The suppression of the

male (but not the female) squamal fringe is also interesting. It has been discussed above. The ornamentation of the posterior wall of the female atrium (here termed the postatrial apparatus) has proved to be particularly valuable for species diagnosis and has made it possible to sink one of the currently accepted species and to recognise six new ones (Mattingly, 1958*a*).

FIG. 2.—Postatrial apparatus of female. (*a*) *Aë.* (*Paraëdes*) *menoni* sp. n.; (*b*) *Aë.* (*Cancraëdes*) *cancricomes.*

The following are the principal diagnostic features of subgenus *Cancraëdes.* Adult ♀ with proboscis at most about 1·2 times as long as front femur. Eyes contiguous. Vertex with broad, flat dark scales, with or without some inconspicuous pale scales at sides. Upright forked scales confined to nape. Anterior pronotal lobes with loosely attached broad scales. Acrostichal bristles absent, dorsocentrals well developed. Postspiracular, lower sternopleural and mesepimeral scale patches absent. Lower mesepimeral bristles at least 2 in number. Paratergite bare. Scutellar scales broad and flat. Tarsi dark. Tarsal claws simple. Fore tibial claw well developed. First hind tarsal segment from about seven-eighths of length of hind tibia to almost equal to it. Squamal fringe short and relatively scanty. Alula with broad decumbent scales, with or without a few narrow fringe scales in addition. Anterior fork cell from about one and a fifth times to twice as long as its stem. Sixth wing vein turned down sharply at tip to meet the wing margin about level with the base of the fork of vein 5 (except in one species). Abdominal tergites II–VI with basal lateral pale spots, sternites pale basally, sometimes all pale on II. Ninth tergite unusually long and narrow. Spermatheca single (triple in one species). Post-atrial apparatus present (fig. 2*b*). Adult ♂ with antenna various but never very strongly plumose. Palps minute as in female. Squama bare. Terminalia (fig. 3, p. 82) with style very small, the terminal appendage represented by an unmodified seta. Subapical lobe of coxite large and complex with various modified spines and a leaflet which is usually pilose. Phallosome with lateral plates unidentate. Parameres very large. Ninth tergite without lobes, with or without setae. Ninth sternite large, sclerotised except for a membranous median area. Pupa with float hairs well developed, trumpets short, tracheoid only at extreme base. Setae 6 and 7 on segment VII very small, seta 7 on segment VIII well developed with several plumose branches. Paddles ovate, slightly pointed at tip with spicules on both borders and long, unbranched apical seta. Larva with antenna spiculate, antennal tuft with several branches. Mouth-brushes without pectinate setae. Head setae B and C both with several branches, B longer than A or C, *d* minute with several branches. Maxillary spine small and inconspicuous. Comb of very numerous transparent, uniformly fringed scales. Siphon short, acus present. Subventral seta short, branched, arising well beyond half way. Spinules at bases of dorsal valves inconspicuous. Saddle incomplete. Ventral brush with 5 pairs of multibranched setae in the barred area, with or without a small precratal seta. Anal papillae small and globular.

A redescription of the male of *Aë. cancricomes* follows.

Aëdes (*Cancraëdes*) *cancricomes* Edwards

Aëdes (*Skusea*) *cancricomes* Edwards, 1922, *Indian J. med. Res.* **10** : 272.
Aëdes (*Skusea*) *simplex* Barraud, 1928, *Ibid.* **16** : 362, *nec* Theobald (*partim*, Andamans record only).
Aëdes (*Skusea*) *simplex* Barraud, *loc. cit.*, Pl. XXXI, fig. 3, *nec* Theobald.
Aëdes (*Cancraëdes*) *simplex* Barraud, 1934, *Faun. Brit. Ind. Dipt.* **5** : 298 (*partim*, Andamans record only) and 297, fig. 73c, *d* (*in toto*) *nec* Theobald.

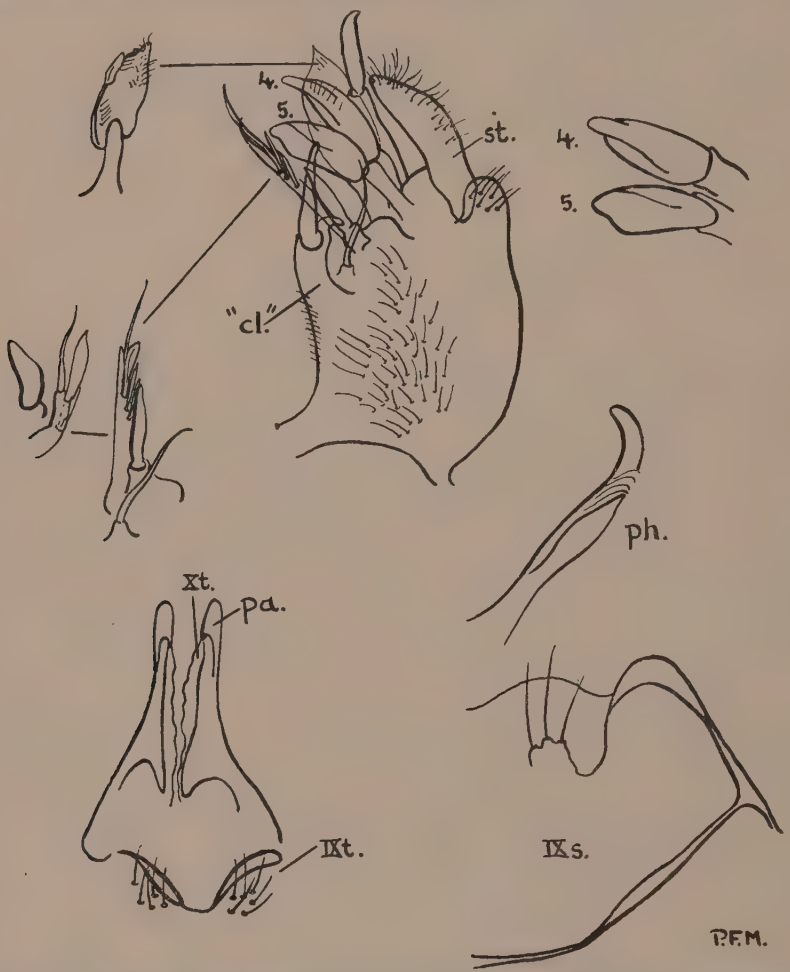

FIG. 3.—*Aë.* (*Cancraëdes*) *cancricomes*. Male terminalia. "*cl*", "claspette"; *pa*, paraproct; *ph*, lateral plate of phallosome; *st*. style; *IXs*, ninth sternite; *IXt*, ninth tergite; *Xt*, tenth tergite; 4, 5, hypertrophied spines on subapical lobe of coxite.

Types.—Holotype ♂ and allotype ♀, ANDAMAN Is.: Port Blair, ix.1915 (*S. R. Christophers*). In British Museum (Nat. Hist.) (see Mattingly, 1958*a*).

Adult ♂.—The following description is based on the holotype (which is undissected), the male paratype figured by Edwards (1922, Pl. V, figs. 34, 35) and the specimen figured by Barraud as *Aë. simplex* (see p. 80). Apart from the terminalia the two latter are very incomplete.

Antenna with verticillary hairs short and scanty, not more than about 6 to each whorl. Flat scales at sides of head only slightly paler than those towards centre. Anterior pronotal lobes with broad dark scales. Posterior pronotum with paler narrow ones. Scutal integument pale to mid-brown. Scutal scales brown with golden reflection. Pleurae pale yellow to pale brown. One to two strong lower mesepimeral bristles present with 1–4 more delicate ones in addition. Sixth wing vein very short. Plume scales narrow. Legs dark except that the hind femur is markedly paler below on about the basal five-sixths of the anterior surface, dark above to base. Abdominal tergites wholly dark, sternites apparently largely so. Terminalia (fig. 3) with style larger than in other species and bearing numerous sub-equal setae from among which the terminal appendage is not differentiated. Coxite swollen with a large patch of short hairs on the inner tergal aspect. Subapical lobe of coxite with two very broad flattened spines (4 and 5 in the figure), a pilose leaflet and other modified setae as figured. One of the latter ("*cl*") has somewhat the appearance and position of the harpago or claspette of some other subgenera of *Aëdes* and was figured as such by Barraud. This spine and the basal arm from which it arises tend to remain attached to the coxite when the rest of the subapical lobe is pulled off. Nevertheless I regard its homologies as extremely doubtful (Mattingly, 1958*a*). Phallosome with some indefinite ornamentation distad of the single tooth on the lateral plate. Ninth tergite with several delicate setae on each side. Ninth sternite with a median setigerous sclerotisation.

Aëdes simplex differs in having the antenna strongly plumose, and the plume scales of the wing even narrower, and in numerous details of the terminalia, notably the much smaller style and very much narrower setae 4 and 5 (*see* Edwards, 1928, fig. 1*e*). The species recorded as *Aëdes cancricomes* from Indonesia (Brug and Bonne-Wepster, 1947 : 185) differs in various details of the male terminalia and has been described elsewhere as a new one (Mattingly, 1958*a*). The same authors' records from Celebes also almost certainly apply to a different species, possibly *Aë.* (*Cancraëdes*) *curtipes* Edwards (Mattingly, 1958*a*). All these exhibit notable differences in the post-atrial apparatus of the female.

References

Barraud, P. J., 1928, A revision of the culicine mosquitoes of India. Part XXIV. The Indian species of the subgenera *Skusea* and *Aëdes*, with descriptions of eight new species, and remarks on a new method for identifying the females of the subgenus *Aëdes*. *Indian J. med. Res.* **16** : 357–75.

—— 1934, *The fauna of British India. Diptera* **5** (*Culicidae : Megarhinini and Culicini*). London.

Brug, S. L. and Bonne-Wepster, J., 1947, The geographical distribution of the mosquitoes of the Malay Archipelago. *Chronica Naturae* **103** : 179–97.

Edwards, F. W., 1922, A synopsis of adult oriental culicine (including megarhinine and sabethine) mosquitoes. Part I. *Indian J. med. Res.* **10** : 249–93.

—— 1928, Mosquito Notes. VII. *Bull. ent. Res.* **18** : 267–84.

—— 1929, Mosquito Notes. VIII. *Ibid.* **20** : 321–43.

Mattingly, P. F., 1958*a* (*in press*), *The culicine mosquitoes of theIndomalayan area. Part III. Genus* Aëdes *Meigen, subgenera* Paraëdes *Edwards,* Rhinoskusea *Edwards and* Cancraëdes *Edwards*. London : Brit. Mus. (Nat. Hist.).

—— 1958*b* (*in press*), Lectotypes of mosquitoes (Diptera, Culicidae) in the British Museum. III. Genera *Sabethes*, *Uranotaenia*, *Udaya*, and *Aëdes*, subgenera *Paraëdes*, *Cancraëdes* and *Skusea*. *Proc. R. ent. Soc. Lond.* (B) **27**.

Thurman, D. C., 1954, The discovery of *Paraëdes* (*Udaya*) *argyrurus* Edwards, 1934, in Thailand (Diptera : Culicidae). *Mosquito News* **14** : 83–86.

ETHIOPIAN CULICIDAE: A DESCRIPTION OF THE EARLY STAGES OF *CULEX* (*CULEX*) *TERZII* EDWARDS

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[Communicated by P. F. Mattingly]

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The adults of *Culex* (*Culex*) *terzii* Edwards and *C.* (*C.*) *vansomereni* Edwards are very similar, differing only in small details of abdominal markings and male terminalia. As could be expected, the larvae are also very alike but a shorter pecten and spine-like comb teeth will separate *C. terzii* from *C. vansomereni*.

Culex (*Culex*) *terzii* Edwards

Larva

The colour of the head and siphon varies and they may be dark or pale brown and sometimes almost colourless.

Head: antennae about three-quarters length of head, slender, slightly curved, spiculate to just beyond the tuft and with the apical half infuscate; tuft at about two-thirds and with 23–28 plumose branches. Seta A with 5–7, B with 3–5 and C with 4–6 plumose branches;

Fig. 1.—*Culex terzii* Edwards. Larva: terminal segments.

d small, simple and single ; *e* and *f* with 3–4 and 3–5 simple branches respectively. Mentum with 1 small and 5 or 6 large teeth on either side. *Abdomen* (fig. 1) : comb a patch of 36–45 small dark teeth, mostly spine-like in appearance and each with a fringe of numerous denticles on either side of a central point ; denticles at base of spines very short and fine but becoming coarser and increasing in length towards the tip, and the last 2 or 3 on either side considerably or only a little shorter than the central point. Siphon with a bend in the dorsal surface beyond the middle (not always very apparent in mounted specimens) and an index of about 4–5½ (mounted larval pelts). Prominent adpressed spines present near the apex, in the form of a coronet which is sometimes complete but more often divided into dorsal and ventral groups—the lateral gap pronounced or only slightly indicated. Spines of coronet arranged in a single or double row but more usually in a single row with a few proximal spines dorsally or ventrally. Pecten consists of 10–12 pale spines which do not reach to a half ; the last 1–2 (sometimes the last 3–4) simple and the others each with 4–7 small or large ventral denticles. Seven to ten alternating subventral tufts placed close to mid-ventral line ; proximal tufts with 4–8, and distal with 2–6, simple branches, which are a little longer than diameter of siphon. A short, lateral, 2–3-branched seta present between the last two subventral tufts. Anal segment with complete saddle, the dorsal apical border of which is minutely spiculate ; lateral seta short, fine, simple and single or bifid. Lower caudal seta single, upper with 2–4 branches. Ventral brush with 14 many-branched setae in the barred area. " Gills " subequal, pointed and about length of saddle or slightly longer.

Pupa

The nomenclature used is that of Belkin (1952 and 1953). *Trumpets* (fig. 2*a*), long and narrow with basal third and sometimes apical half darkened. *Thorax* with all seta (except hair 6) about one half length of trumpets and simple ; hair 6 much shorter. Hairs 1, 2 and 3 usually bifid but hair 1 sometimes trifid. Hair 4 with 2–3 branches and 5 4-branched ; hair 6 trifid, 7 and 9 bifid and 8 4-branched. Hairs 10, 11 and 12 with 5–7, 1–2 and 2 plumose branches respectively. *Abdomen :* dorsal abdominal chaetotaxy as in figure 2*b*. Although very little variation was noted, hair 7 can be single or trifid on segments II–VI and with 6 and 7–11 branches on VII and VIII respectively ; hair 1 has up to 6 branches on segments IV–VI and 1–3 branches on segment VII. *Sternites :* hair 14 present on segments III–VII. Hair 12 is the longest seta, being about two-thirds length of following segment ; the other hairs about one-third the length of 12, except on segments VI–VII, where hair 10 the same length as 12. Hair 8 very short and with 2–3 branches on segments III–VI, single, bifid or trifid and longer on VII. Hair 10 with 4–5 branches on segments III and V ; single on the rest. Hair 11 single ; internal to 12 on segments III–V and external on the other segments. Hair 12 bifid on segments III–IV and long and single on the rest. *Paddles :* pale and rounded, with a strong buttress on basal half of external border and with the apex smooth ; hairs very short, simple and fine.

Described from four larval and four pupal pelts with associated adults collected by Mr. R. W. Woods, Research Laboratory, Causeway, S. Rhodesia, in June, 1956. Mr. Woods also sent a long series of bred males and females, some unassociated larval pelts and a few pupae from the same breeding place. These larvae were taken from two pools on Domboshawa hill, about 20 miles to the north-east of Salisbury, S. Rhodesia.

The first pool was about 6 × 2 feet in area, up to 1 foot deep and with a layer of mud at the bottom. The water was foul, with a high organic content, and algae were the only vegetation in the pool. It was without shade all day and the surroundings were bare except for a few tufts of grass at each end and some trees about 50 yards away. The second pool was about 75 yards above the first. It was approximately 20 feet in diameter, without shade or vegetation, and

the water, though turbid, appeared quite clean. Both pools also contained larvae of *C. duttoni* Theo., *C. univittatus* Theo. and *C. tigripes* Grp. and C.

In addition to the above, Mr. Woods sent me from S. Rhodesia twelve whole larvae from a swimming pool at Motoko, six larvae from a very deep well in the Lundi Native Reserve and one larva from a dam in the Chingomo area, Belingwe Native Reserve (31° E., 21° S.). Mr. Mattingly, British Museum (Natural

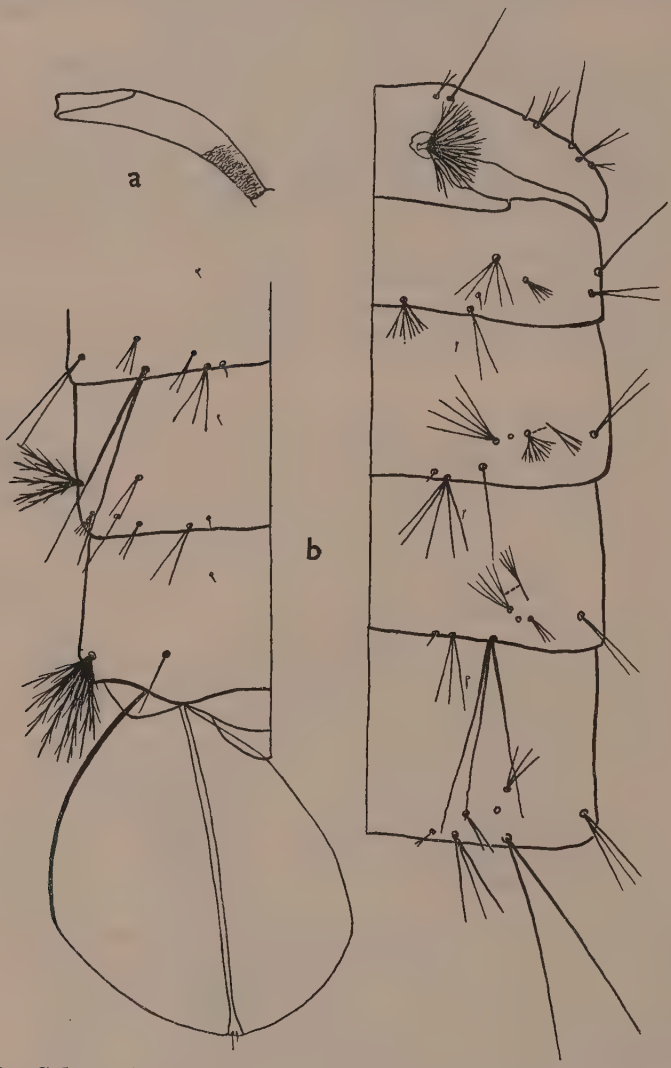

Fig. 2.—*Culex terzii* Edwards. Pupa: (*a*) trumpet; (*b*) abdominal tergites.

History), London, also sent me some larvae from S. Rhodesia. These were collected by H. S. Leeson, and six of the larvae and two pupae came from Sinoia and three larvae from Salisbury (one from a rock pool, 1927 and four from a tub, 1926). I have also seen material from Kenya, Uganda and Abyssinia.

From Kenya there are three males and three females, with associated pelts, bred from larvae taken from rock holes in the Thiririki river (approx. 36° 50′ E., 0° 68′ S.), one larva from a stream, and a male from Kitale. The Uganda material was collected by Dr. A. J. Haddow, Virus Research Institute, Entebbe, and consists of nine males and three females bred from larvae taken from a rock hole at Kaabong, Karamoja and one larva, also from a rock hole, at Kaabong. In Abyssinia, Mr. Lane, of the American Malaria Survey, took adults at Gogora, where he also collected larvae from rock pools.

The male terminalia and adult ornamentation of all the above specimens agree with Edwards' (1941) description of *C. terzii* except that the females, like the males, have definite inverted V-shaped dark markings on the abdominal sternites. The larvae are all alike and differ from *C. vansomereni* in having a shorter pecten and spine-like comb teeth ; this last character is more pronounced in some specimens than in others. In addition to the characters given in the above description, some of the Rhodesian specimens have head seta A 8-branched, the comb and pecten with as many as 50 and 14 teeth respectively and with as few as 33 and 6 teeth respectively, and the siphonal index can be as much as six. The comb teeth of the Thiririki larvae are not so definitely spine-like (the lateral denticles being only slightly shorter than the central point) and the siphonal index is $3\frac{1}{4}$–$4\frac{1}{2}$. The Abyssinian specimens have fewer teeth in the comb (25–32) and the teeth are pale and not markedly spine-like ; the terminal point projects only slightly above the basal fringe. One of the Abyssinian specimens has the last pecten tooth well separated from the rest and placed beyond the first subventral tuft. Another has an unusual coronet of spines at the apex of the siphon—the spines are arranged in two semicircular rows on the ventral surface and the dorsal surface is bare.

Although the larvae of *C. terzii* and *C. vansomereni* are very alike, the character of the pecten and the comb teeth will serve to separate the two. The pecten of *vansomereni* usually consists of 16 teeth and reaches to, and usually beyond, the first subventral tuft ; the comb consists of coarsely fringed scales and has no spine-like teeth. The pecten of *terzii* usually has ten teeth and seldom reaches the first subventral tuft and often ends well before it ; the comb has many spine-like teeth. The spine-like appearance of the comb teeth of *terzii* larvae is striking in the Rhodesian and Uganda specimens but not so marked in the specimens from Abyssinia and from the Thiririki river, Kenya. It should also be noted that the difference between the comb teeth of *vansomereni* and *terzii* is only apparent when the teeth are lying flat. Viewed from an angle the comb teeth of both species look alike.

The paedotypes, and the larvae collected by Mr. Leeson, will be deposited in the British Museum (Natural History), London, and the rest of the material will remain in the collection of the Division of Insect-borne Diseases, Medical Research Laboratory, Nairobi, Kenya.

C. terzii runs down to couplet 6 in the *Key to the Known Larvae of the Genus* Culex (Hopkins, 1952), which should be amended as follows to include this species :—

6	Siphon with a bend towards the dorsal side near the apex	6a
	Siphon straight	7
6a	Two pairs of single or double subventral tufts . . .	**toroensis** (p. 314)
	Seven to ten alternating, 4–8-branched, subventral tufts .	**terzii** [in part]

8 Subventral tufts inconspicuous; shorter than the diameter of the siphon . . . . . **chorleyi** (p. 316)
These tufts larger; longer than the diameter of the siphon . . . 8a
8a Pecten long, reaching to beyond the first subventral tuft; no spine-like teeth in the comb . . . . . **vansomereni** (p. 312)
Pecten short, not reaching to the first subventral tuft; many spine-like teeth in the comb . . . . . **terzii** [in part]

Acknowledgments

I wish to thank the collectors mentioned in the text for kindly sending me the material for this paper.

References

Belkin, J. N., 1952, The homology of the chaetotaxy of immature mosquitoes and a revised nomenclature of the chaetotaxy of the pupa. *Proc. ent. Soc. Wash.* **54** : 115–30.

—— 1953, Corrected interpretations of some elements of the abdominal chaetotaxy of the mosquito larva and pupa. *Ibid.* **55** : 318–24.

Edwards, F. W., 1941, *Mosquitoes of the Ethiopian Region.* Vol. 3.

Hopkins, G. H. E., 1952, *Mosquitoes of the Ethiopian Region.* Vol. 1. 2nd edition.

MOSQUITOES OF NEW GUINEA (DIPTERA : CULICIDAE). PART I

By W. Peters

(*Malariologist, Department of Public Health, Territory of Papua and New Guinea*)

A number of new species and undescribed stages of known species of mosquitoes have been captured in the Territory of Papua and New Guinea during the course of surveys conducted by the staff of the Malaria Section, Department of Public Health. This is the first of a series of papers in which this new material will be described.

Mansonia (*Mansonioides*) *papuensis* Taylor

Taylor, 1914, *Trans. ent. Soc. Lond.* **1914** : 200.

Male.—Head : clothed above with long narrow erect forked scales on the vertex, scattered erect and recumbent narrow curved scales on front of vertex and eye margins, flat yellow scales laterally on eye margins ; antennae light brown, a little longer than

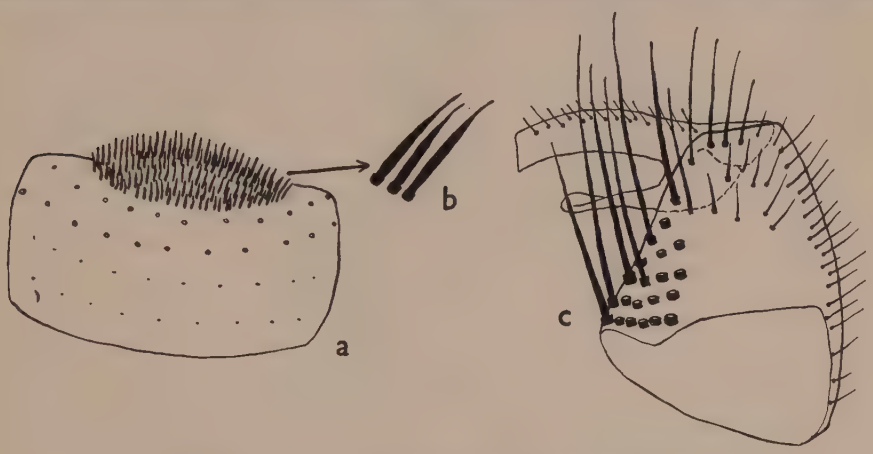

Fig. 1.—*Mansonia* (*Mansonioides*) *papuensis* Taylor.
(*a*), (*b*) eighth sternite ; (*c*) coxite.

proboscis ; palpi uniformly light brown, blunt tipped, nine-tenths length of proboscis ; the latter slightly wider at tip than base, light brown, paler in the middle third. *Thorax :* integument dark brown ; scutum with small narrow curved golden scales scattered thinly over the whole scutum except in prescutellar space, a few acrostichal bristles present centrally, long dark brown bristles arising from front and sides of scutum ; scutellum apparently with a few scattered narrow curved scales on all lobes (specimen rubbed) ; pleurae unscaled but with long setae. *Legs :* uniformly dark brown with small yellow patches on femora less conspicuous than in the female. *Wings :* veins covered with flat broad scales, all dark brown. *Abdomen :* dark shining integument with few scales. *Terminalia :* eighth sternite (fig. 1*a*, *b*) with a conspicuous patch of strong blade-like hairs apically on the central area ; coxite (fig. 1*c*) of the general *Mansonioides* type, very broad ;

style broad and rectangular with a club-shaped proximal arm; basal lobe of coxite inconspicuous, numerous strong bristles on tergal coxite margin; arms of paraprocts well separated, crowned with 3 or 4 long recurved teeth.

Description based on a single specimen from Territory of Papua and New Guinea: Wewak, Sepik District, 27.vii.1957, night catch. To be deposited in the collection of the Division of Entomology, C.S.I.R.O., Canberra.

Aëdes (*Leptosomatomyia*) *variepictus* King and Hoogstraal

King and Hoogstraal, 1946, *Proc. ent. Soc. Wash.* **48** : 98.

Male.—Head : antennae golden-brown, very bushy, half as long as proboscis, terminal segments dark brown; palpi dark brown with a streak of yellow scales dorsally from the middle ending before apex; about one-sixth length of proboscis. *Thorax :* narrow dark

Fig. 2.—*Aëdes* (*Leptosomatomyia*) *variepictus* King and Hoogstraal. Male terminalia.

scales mainly on sides of scutum, the rest yellow; numerous golden bristles dorsally, yellow scales not forming a conspicuous submedian line. (Ornamentation otherwise as in the female described by King and Hoogstraal.) *Terminalia* (fig. 2) *:* ninth tergite incompletely divided with 8 or 9 long fine hairs; coxite fairly long and slender with a bristly finger-like basal lobe nearly half as long as coxite; style two-thirds as long as coxite, slender with a lanceolate process at tip one-third as long as style; paraprocts long and slender with 2 or 3 minute teeth at apex; broad flat blunt scales numerous on outer and tergal aspects of coxite and numerous fine hairs on all surfaces.

Described from a small series of 5 ♂ and 7 ♀, Territory of Papua and New Guinea: Western Highlands District (5400 feet), reared from larvae

recovered from a treehole at Minj (*Mr. S. H. Christian*). Unfortunately the larval and pupal skins were not preserved. To be deposited in the collection of the Division of Entomology, C.S.I.R.O., Canberra, and the British Museum (Natural History), London.

The females from Minj agree with the description of the type and paratypes from the Cyclops Mts., except that there are numerous long yellow bristles on the scutum of the former. The dark scutal scales are more widespread than in the male.

Culex (Culiciomyia) ruthi sp. n.

The following species is distinguished from the other species of the subgenus, as far as can be ascertained, by the presence of a pale ring on the proboscis of the male (represented in the female by the pale ventral surface of the proximal three-fifths of the proboscis), pale basal abdominal bands, the absence of pleural scales or distinctive markings and by the distinctive genitalia of the male.

Male.—Head : vertex covered with flat narrow light brown scales on a dark integument and darker brown erect scales ; sides of head covered with flat white scales and a single row of similar scales along eye margins ; antennae light brown, shorter than proboscis ; palpi light brown, exceeding length of proboscis by whole of terminal segment ; 6–8 specialised scales on middle third of shaft, long and hair-like ; proboscis with a distinct narrow pale band in middle or just beyond, and pale labella. *Thorax :* integument light brown on scutum, pale green on pleurae ; scutum covered with very narrow small brown scales, scanty in the antescutellar space ; scutellum with a few smaller brown scales on all lobes ; 5–7 pairs of strong brown prescutellar bristles, numerous strong acrostichal, prescutal and pre-alar bristles ; pleurae pale green, devoid of scales or distinctive markings, one large lower mesepimeral bristle. *Abdomen :* dark brown dorsum, pale venter, a narrow basal white band on tergites II–VII expanded to form basal lateral triangles on II–VII. *Wings :* scales pale brown, anterior cross-vein well distal to posterior cross-vein ; length about 2·8 mm. *Legs :* medium brown in colour ; fore femur pale ventrally for whole length, mid femur pale ventrally on basal two-thirds, hind femur pale ventrally from base to apex ; a line of pale scales on basal two-thirds of anterior surface of hind tibia ; narrow indistinct pale bands at apex of hind tibia and tarsal segments 1–4, spreading to bases of preceding segments, less distinct on mid and fore legs. *Terminalia :* style of coxite (fig. 3*a*) greatly expanded, membranous and twisted outwards ; 2 strong terminal spines and 2 delicate subterminal hairs ; coxite very broad, the subapical lobe divided into 3 parts as follows : anteromedial with a single stout rod ; posterolateral with 2 hooked longer rods ; posteromedial with a long blade-like leaflet and a single moderately long hair just anteromedially to which is a small conical lobe covered with short hairs ; many long hairs and bristles on body of coxite and 2 or 3 very long bristles each side of junction with style ; paraprocts (fig. 3*b*) very broad with a crown of 10–12 broad finger-like processes, smaller and more pointed medially, a few delicate hairs on lateral distal surface ; lateral plate of phallosome (fig. 3*c*) simple, sickle-shaped with no teeth, the surface minutely spiculate.

Female.—Very similar to male but the following points are noted :

Head : area of dark recumbent scales on vertex broader ; labella pale, proboscis distinctly pale on basal three-fifths of ventral surface only. *Abdomen :* pale abdominal basal bands present on tergites II–VIII, those on VII and VIII narrower medially. *Legs :* fore tibia pale scaled ventrally, hind tibia with the pale exterior line broadened ventrally. *Wings :* length about 3·4 mm.

Larva and pupa unknown.

Described from holotype ♂ and 4 paratypes, allotype ♀ and 1 paratype; all captured flying in the entrances of small crab holes in partial shade on the beach.

Holotype ♂, PAPUA: Mapamoiwa, Fergusson Island, 4.x.1956 (*Dr. W. Peters*). *Allotype* ♀, same locality data. *Paratypes*, same locality data. The holotype, allotype and two male paratypes will be deposited in the collection

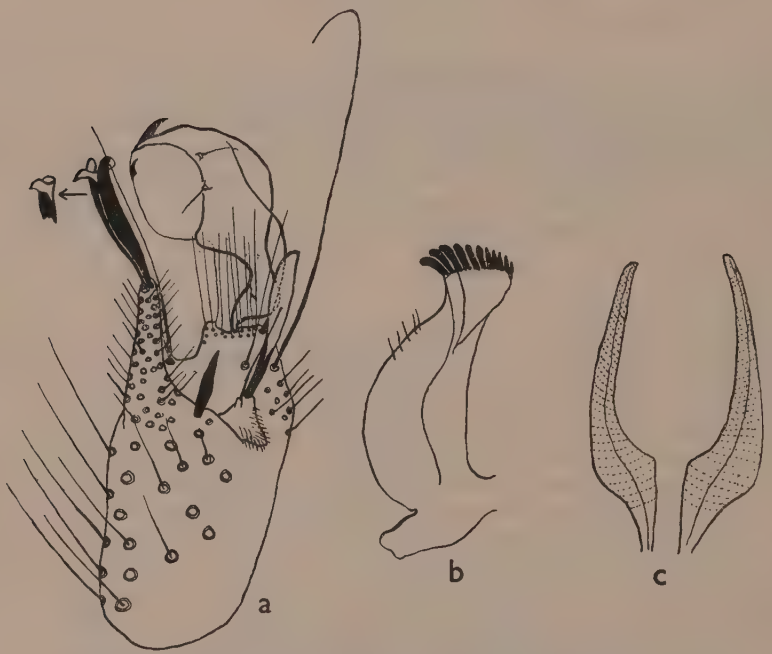

FIG. 3.—*Culex* (*Culiciomyia*) *ruthi* sp. n. Male terminalia : (*a*) coxite ; (*b*) paraproct ; (*c*) phallosome.

of the Division of Entomology, C.S.I.R.O., Canberra, and two male and one female paratypes in the British Museum (Natural History). This species is named in honour of the author's wife.

ACKNOWLEDGMENTS

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UNUSUAL ANTENNAL CHARACTERS IN SOME LAEMOPHLOEINAE (COLEOPTERA : CUCUJIDAE) AND THEIR TAXONOMIC IMPORTANCE

By L. P. Lefkovitch

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In many groups of beetles there are species which show sexual dimorphism in the structure of the adult antennae, the structures being sometimes most bizarre. In the Laemophloeinae, where the males of some species have modified antennae, it is the scape which is atypical, with occasional modifications of the pedicel and succeeding segments in a few species.

Apart from the manifestations described below, the Laemophloeinae fall into three groups in regard to their antennae. In the first, the sexes cannot be distinguished upon any antennal character, *e.g.* the genus *Leptophloeus* (where even the usual heteromeric tarsal arrangement of the male is not found). In the second group, the male antennae are slightly longer than those of the female, e.g. *Cryptolestes ferrugineus* (Steph.) and *Laemophloeus monilis* (F.). In the third group, the male antennae are considerably longer than those of the female, e.g. *Cryptolestes turcicus* (Grouvelle) and *Laemophloeus biguttatus* (Say). In considering the whole subfamily, the occurrence of elongated antennae in the male is not a diagnostic feature of any one genus, such elongation being an attribute of the individual species.

Examination of long series and large numbers of specimens of the species having the more pronounced antennal characters has demonstrated that within each species the antennal modifications can be arranged in a graded series according to the degree of modification present. This expression of heterogonic growth, a characteristic of the Laemophloeinae, has misled some previous students of the group into describing specific differences between specimens where none, in fact, exist. It is now possible to clarify some of this confusion and to make generic re-assignments for the species discussed below, hitherto included in *Laemophloeus* sens. lat. A summary of the material examined is given in the appendix.

Cryptolestes Ganglbauer

Five species of this large genus show unusual scapes in the male, the developments being, in general, unrelated between the species.

Cryptolestes punctatus (Leconte) **comb. nov.**

Laemophloeus punctatus Leconte, 1854, *Proc. Acad. nat. Sci. Philad.* **8** : 75.
Microbrontes uncicornis Reitter, 1874, *Verh. zool.-bot. Ges. Wien* **24** : 45, **syn. nov.**
Laemophloeus recticollis Reitter, 1876, *Col. Hefte* **6**, 52, **syn. nov.**
Laemophloeus denticornis Casey, 1884, *Trans. Amer. ent. Soc.* **11** : 94, **syn. nov.**
Laemophloeus iteratus Sharp, 1899, *Biol. C. Amer. Col.* **2** (1) : 528, **syn. nov.**
Laemophloeus addendus Sharp, 1899, *loc. cit.* **2** (1) : 529, **syn. nov.**

This New World species has been described as new on several occasions, the distinguishing features of the different " species " being the degree of complexity in the male antennal structure and associated changes in the head. Figure 1 shows a small form of the male scape, figure 2 a female and figure 3 the extreme form of the male. The changes occurring in the head associated with the increase in size of the scape are indicated ; the slight sinuation at the antennal insertion in the female (fig. 2) becoming a rectangular indentation in a large male (fig. 3).

This species possesses the distinguishing features of *Cryptolestes* (see Lefkovitch, 1958) and has affinities with *C. duplicatus* (Waltl)).

Cryptolestes diemensis (Blackburn) **comb. nov.**

Laemophloeus diemensis Blackburn, 1903, *Trans. roy. Soc. S. Aust.* **27** : 140.

The scape in the male of this Australian species is rectangular in section, sickle-shaped and with the pedicel not inserted apically upon the scape (fig. 4). The pedicel and succeeding six segments are very transverse and flattened, the most transverse segment, the third, being two and a half times wider than long. The female shows no such modifications (fig. 5). The adult features all show that this species is a true *Cryptolestes*, although not belonging to the same section of the genus as *C. punctatus* (Leconte).

Cryptolestes fauvelli (Grouvelle) **comb. nov.**

Laemophloeus fauvelli Grouvelle, 1883, *Ann. Mus. Stor. nat. Genova* **18** : 286.

There is a certain resemblance between the scape of the male of this Pacific Island species (fig. 6) and that of *C. diemensis* (fig. 4). Essentially, the scapes differ mainly in size and degree, the fundamental distinction being that in *C. diemensis* this segment is pointed apically, whereas in *C. fauvelli* it is rounded. The two species are closely related to each other, *C. fauvelli* having all the features distinguishing *Cryptolestes* from other Laemophloeinae. The female scape (fig. 7) shows no unusual features.

Cryptolestes beccarii (Grouvelle) **comb. nov.**

Laemophloeus beccarii Grouvelle, 1883, *Ann. Mus. Stor. nat. Genova* **18** : 286.

A long series of this Pacific Island species has shown the range of variation which may occur in the form of the male scape. The smallest male (fig. 9) shows a first segment hardly longer than that of the female (fig. 8) but having indications of lateral processes. These processes are intermediate in size in the male represented in figure 10 and largest in figure 11. The head of the male shows an increasing height with increasing size of the scape.

Both sexes possess all the distinguishing features of *Cryptolestes*.

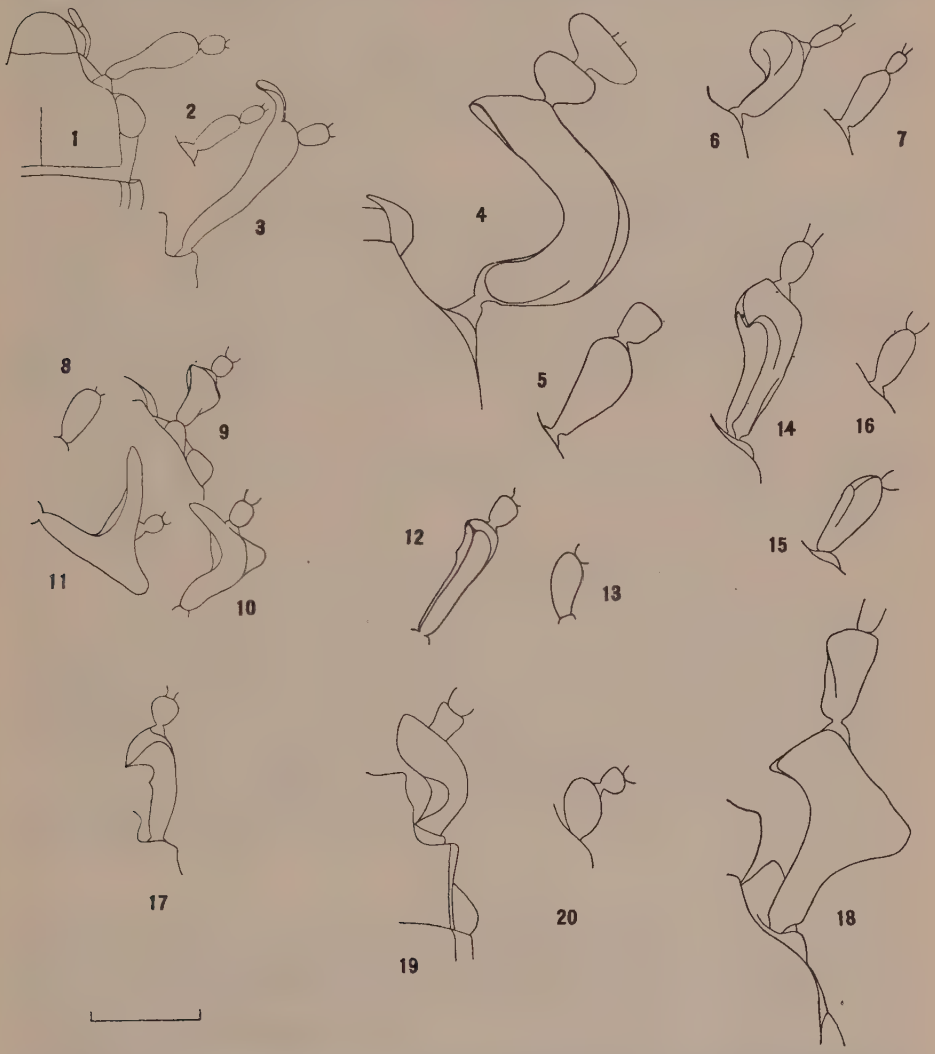
Cryptolestes planulatus (Grouvelle) **comb. nov.**

Laemophloeus planulatus Grouvelle, 1896, *Ann. Soc. ent. Fr.* **65** : 88.

The scape in the male of this African species (fig. 12) resembles that of *Microbrontes laemophloeoides* Reitter (see below, and fig. 14) but is less thickened distally. In other respects the two species are quite distinct. Both sexes of *C. planulatus* have typical *Cryptolestes* features, the scape of the female being quite normal (fig. 13).

Microbrontes Reitter

This genus is well differentiated from *Cryptolestes* and from other Laemophloeinae (Reitter, 1874). A redescription of *Microbrontes* will be given in a later paper which will include species not possessing modified scapes in the male. A study of the generic type has shown that Reitter was in error in giving the male tarsal formula as 5, 5, 5. In the eight males I have examined (including the



FIGS. 1–20.—Dorsal view of right scapes of Laemophloeinae : (1, 3) *Cryptolestes punctatus* (Leconte), ♂ ; (2) the same, ♀ ; (4) *C. diemensis* (Blackburn), ♂ ; (5) the same, ♀ ; (6) *C. fauvelli* (Grouvelle), ♂ ; (7) the same, ♀ ; (8) *C. beccarii* (Grouvelle), ♀ ; (9), (10), (11) the same, ♂ ; (12) *C. planulatus* (Grouvelle), ♂ ; (13) the same, ♀ ; (14), (15) *Microbrontes laemophloeoides* Reitter, ♂ ; (16) the same, ♀ ; (17) *M. blackburni* (Grouvelle) ♂ ; (18) *M. lineatus* (Broun), ♂ ; (19) *Dysmerus basalis* Casey, ♂ ; (20) the same, ♀. Scale line = 0·5 mm.

type held by the British Museum (Natural History)), I found the tarsal formula to be 5, 5, 4.

Microbrontes laemophloeoides Reitter

Microbrontes laemophloeoides Reitter, 1874, *Verh. zool.-bot. Ges. Wien* **24** : 520.

In the male of this Japanese species, the first antennal segment is elongate, dilated distally and dorsally produced into a blunt point (fig. 14). The remainder of the antenna shows no unusual morphological features. Figure 15 shows a less developed form of the male scape, comparable with the small male of *C. punctatus* (Leconte) illustrated in figure 1. The female scape is illustrated for comparison (fig. 16).

Microbrontes blackburni (Grouvelle) **comb. nov.**

Laemophloeus blackburni Grouvelle, 1902, *Ann. Soc. ent. Belg.* **46** : 187.
Laemophloeus frenchi Blackburn, 1903, *Trans. roy. Soc. S. Aust.* **27** : 146.

In this Australian species, the male scape resembles that of *C. diemensis* but possesses a small tooth about half-way along its internal margin (fig. 17). In its general form it can most easily be derived from that of *M. laemophloeoides*, several points of resemblance being easily noticeable from the illustrations. I have seen two specimens only of this species, these being the types of Grouvelle's and Blackburn's descriptions. These two males have all the distinguishing features of *Microbrontes*, resembling the males of *M. laemophloeoides* very closely. I have not been able to recognise a female in any of the collections I have examined.[1]

Microbrontes lineatus (Broun) **comb. nov.**

Tularthrum lineatum Broun, 1893, *Man. N.Z. Col.* **5** : 1103.

Broun's single specimen of this New Zealand species has been examined. This male, the holotype, shows in the form of the scape (fig. 18), a degree of resemblance to that of *C. beccarii* (figs. 9–11), but the beetles are otherwise dissimilar. In *M. lineatus* the pedicel is modified, being keeled dorsally. I have not been able to recognise the female of this species.

This species has all the diagnostic features of *Microbrontes*, and thus *Tularthrum* Broun, since it is monobasic, becomes a synonym of *Microbrontes* Reitter **syn.nov.**

Dysmerus Casey

Casey (1884) in erecting this genus upon a single male, wrote " Although most closely allied to the above-mentioned genus [*Laemophloeus*], I feel warranted in separating it [*Dysmerus*] on account of the mode of attachment of the second joint of the antennae to the first, it being unlike anything existing in that genus, where the second joint is always joined to the apex of the first." This lateral attachment of the pedicel appears to be present in the female as

[1] Since this article was prepared for publication, a further series of four specimens of *Microbrontes blackburni* (Gr.) has been found amongst the unincorporated accessions in the British Museum (Natural History). Three of these are males, their scapes being identical with that in figure 17. The fourth, a female, has a normal scape and could easily be represented by figure 16, which is the scape of a female of *M. laemophloeoides* Reitter.

well as in the male. Schwarz (1888) considered that the females were ordinary *Laemophloeus* and that males did not show any real generic distinction. Upon a female specimen alone, it is likely that Casey (1916) would have included *Dysmerus* in his genus *Leptophloeus*. But since the adaptive radiation of this latter genus is not yet fully known, and since *Dysmerus* appears to be quite distinct from it as at present understood, I consider that *Dysmerus* should be kept as a valid genus.

Dysmerus basalis Casey

Dysmerus basalis Casey, 1884, *Trans. Amer. ent. Soc.* **11** : 97.
Laemophloeus caseyi Grouvelle, 1898, *Not. Leyd. Mus.* **20** : 42, **syn. nov.**
Dasymerus (sic) *sulcicollis* Grouvelle, 1908, *Ann. Soc. ent. Fr.* **77** : 56, **syn. nov.**

The scape of the male of this North American species (fig. 19) shows some resemblance to that of *C. diemensis* (fig. 4) although the two species are not closely related. The female scape shows slight modifications (fig. 20) which would, however, not be considered unusual if the male were unknown.

I have examined the types of *Laemophloeus caseyi* Grouvelle and of *Dasymerus sulcicollis* Grouvelle and found that there was no difference between them and *Dysmerus basalis* Casey other than the normal variation of secondary sexual characters within a species.

Discussion

In the Laemophloeinae, the heterogony of a secondary sexual character has been inadvertently used by previous workers as the basis of the description of new species. This has occurred with *Cryptolestes punctatus* (Leconte), two other authorities each having redescribed the species as new upon two occasions. One can imagine such a situation arising in *C. beccarii* (Grouvelle) if that species were more widely distributed in areas of the world inhabited by entomologists.

Several genera and subgenera have been erected to contain species in possession of these secondary sexual charaters. In each case, the distinguishing features of the genus have been either the obvious secondary sexual characters or modifications of the body associated with them. The unsatisfactory nature of such a procedure is self-evident even if there is a true generic relationship between the species included. Kessel (1921) erected *Brontophloeus* by " Das 1. Fühlerglied ist beim Männchen abnorm gebildet " only. The 11 species listed by him show no particular resemblance to each other (except where synonyms are given). In a later work, Kessel (1926) ignored this and other subgenera created by him on equally unsound criteria. Since *Dysmerus basalis* Casey is included in Kessel's original list of species, the name *Dysmerus* being given in parentheses after *basalis*, I hereby select *Dysmerus basalis* Casey to be the generic type of *Brontophloeus* Kessel. The latter therefore becomes a junior synonym of *Dysmerus* Casey **syn. nov.**

Horns occur on the heads of males in many groups of beetles but they are rarely present in both sexes (Arrow, 1951). Arrow (*op. cit.* : 85) mentions that amongst the many small species in the Cucujidae some have horns. As an example he gives *Deinophloeus ducalis* Sharp which possesses clypeal horns in the male. This species and those of the genus *Planolestes* (the males of the four species at present included being similarly horned) are fairly large-bodied

representatives of their group, and thus follow Arrow's generalisation that in the larger species of a group of animals, there is a tendency towards the formation of horns.

Large size, even relative to the majority of the Laemophloeinae, is not a feature of the species whose antennal modifications are noted above. For example, *Cryptolestes beccarii* (Grouvelle) is one of the smallest members of the subfamily. It is reasonable, therefore, to suggest that these antennal modifications have not arisen as a consequence of the increasing size of the individual species with (evolutionary) time but as a result of some other factor.

Darwin's sexual selection theory has been discussed by Arrow (*op. cit.*), who considered it to be inapplicable. Arrow states that contests between males must necessarily involve anteriorly situated horns but this does not imply that their primary function is that of combat. Further, he suggests that recognition between the sexes is usually by scent and not by sight, and that the eyes of horned beetles are not adapted for seeing detail. Most convincingly, he points out that it is the males which seek out the females and not *vice versa*.

Arrow went on to explain the presence of horns as being a consequence of the function of males in general. He suggested that as long as a male has organs enabling him to find and fertilise the female, there is no selective pressure upon any other part of the body. Great ability of males in escaping predation is not of particular importance since a limited survival is all that is required. Thus changes of form in different parts of the body, where not interfering with the ability of the male to fertilise the female, can come into existence and persist.

This hypothesis may be true of species in which there is an abundance of males and where one fertilisation of the female is sufficient. But if repeated fertilisation is required, the sex-ratio is unity and both sexes are long lived, it does not appear likely that Arrow's view can account for changes in the form of the body through freedom from selective pressure. Predation would then be of importance and normal functioning of all parts of the body would be equally essential for both sexes. A long adult life is known to occur in several species of the Laemophloeinae and it seems likely that this is true for the species under discussion.

It is possible that these antennal modifications are useful in copulation. If so, it can only be as a means of recognition between the sexes. The musculature of the scape is very poor, making any function as claspers unlikely. Further, if the copulatory position in these beetles is similar to that adopted by the storage species of *Cryptolestes*, that is the adults facing in opposite directions (*see* Rilett, 1949, for *C. ferrugineus* (Steph.) and Herford, 1931, for *C. pusillus* (Schön.) (wrongly called *Laemophloeus turcicus* Grouvelle)), the possibility of the scape functioning as a clasper seems to be even more unlikely.

The superficial resemblance between the antennal modifications described above and the general form of mandibles is easy to discern. It is possible to imagine that in the usual habitat of these beetles (*i.e.* under bark) an individual apparently having large, moving mandibles at the base of the antennae, would have some selective advantage over individuals without such a modification. Arrow, in considering this possibility, suggested that such an advantage would be more important for the survival of the species in females than in males, but he pointed out that horns are rare in females. He may not have considered that in species with long-lived adults and in which the males search out the

females, such modifications in the male could be of advantage to that sex and not to the other. This argument is controversial, resting as it does upon unproved hypothesis, but it is more satisfying than assuming that these changes neither have a function nor are influenced by a selective process. Arrow, generalising about the position of horns, wrote that they are never found upon vital parts of the body. In the beetles described above, the presence of " horns " on the antennae may remove these animals from the scope of this and Arrow's other conclusions.

It is worth noting that a South American Platypodid, *Tesserocerus insignis* Saunders (1836), possesses a modified scape not unlike those of *C. punctatus* and *C. diemensis*, and possibly of similar function.

Observations upon living adults might well lead to an understanding of the function of the scape. The author hopes that this paper will stimulate such observation and is willing to carry out identifications of these and other species of the Laemophloeinae to facilitate the work of ecologists and ethologists.

Certain species, which according to their original descriptions possess a modified scape in the male, have not been examined. These are *Microbrontes exiguus* Grouvelle, *M. bellus* Grouvelle and *Laemophloeus* (*Microbrontes*) *fairmairi* Grouvelle. The generic position of these species must remain in doubt until their types have been examined.

Acknowledgments

Many useful suggestions were given to me in the course of discussion with my colleagues at the Pest Infestation Laboratory, and in particular with Dr. B. P. Moore. Thanks are due to the British Museum (Natural History), the Commonwealth Institute of Entomology, the Hope Department of Entomology, Oxford and the Muséum National d'Histoire Naturelle, Paris for allowing me to examine their collections. This paper is published with the permission of the Department of Scientific and Industrial Research.

Summary

(1) Secondary sexual antennal characters of an unusual nature in the scape of male Laemophloeinae are described and illustrated.

(2) The function of these modifications is discussed.

(3) Certain new synonymies and combinations are presented.

References

Arrow, G. J., 1951, *Horned Beetles—A study of the fantastic in nature.* Ed. W. D. Hincks, 154 pp. The Hague.

Casey, T. L., 1884, Revision of the Cucujidae of America north of Mexico. *Trans. Amer. ent. Soc.* **11** : 66–112.

—— 1916, Some random studies among the Clavicornia. *Mem. Col.* **7** : 35–300.

Herford, G. V. B., 1931 (*unpublished*), The biology of *Laemophloeus turcicus* Grouvelle, with special reference to nutrition and the effects of atmospheric humidity. (Thesis submitted to the graduate faculty of the University of Minnesota.)

Kessel, F., 1921, Neue Monotomiden, Cucujiden u. Passandriden aus der Sammlung des Deutschen Entomologischen Museums in Berlin. *Arch. Naturgesch.* **87** : 25–33.

—— 1926, Synopse geral do genero *Laemophloeus* Cast. *Arch. Mus. nac., Rio de J.* **26** : 59–93.

Lefkovitch, L. P., 1957, A new genus and species of Laemophloeinae (Col. Cucujidae) from Africa. *Ent. mon. Mag.* **93** : 271–273.

Reitter, E., 1874, Beschreibungen neuer Käfer-Arten nebst synonymischen Notizen. *Verh. zool.-bot. Ges. Wien* **24** : 509–28.

Rilett, R. O., 1949, The biology of *Laemophloeus ferrugineus* (Steph.). *Canad. J. Res.* (D) **27** : 112–48.

Saunders, S. S., 1836, Descriptions of some new species of coleopterous insects lately received from Monte Video. *Trans. ent. Soc. Lond.* (1) **1** : 149–57.

Schwarz, E. A., 1888 [Proceedings of the meeting September 1, 1887]. *Proc. ent. Soc. Wash.* **1** : 95.

Appendix

Summary of Material Examined

Species and synonyms	Whether type seen	Other material examined
(1) *Cryptolestes punctatus* (Leconte)	.	.
Laemophloeus punctatus Leconte	No	Three series of 2 specimens.
Microbrontes uncicornis Reitter	Yes	.
Laemophloeus recticollis Reitter	,,	.
Laemophloeus denticornis Casey	No	Five single specimens.
Laemophloeus iteratus Sharp	Yes	.
Laemophloeus addendus Sharp	,,	.
Previously unidentified material	.	One series of 49 specimens. One series of 15 specimens. One series of 6 specimens.
(2) *Cryptolestes diemensis* (Blackburn)	.	.
Laemophloeus diemensis Blackburn	Yes	One series of 4 specimens.
(3) *Cryptolestes fauvelli* (Grouvelle)	.	.
Laemophloeus fauvelli Grouvelle	No	One series of 7 specimens.
(4) *Cryptolestes beccarii* (Grouvelle)	.	.
Laemophloeus beccarii Grouvelle	No	One series of 34 specimens.
(5) *Cryptolestes planulatus* (Grouvelle)	.	.
Laemophloeus planulatus Grouvelle	No	One series of 2 specimens.
(6) *Microbrontes laemophloeoides* Reitter	Yes	One series of 10 specimens.
(7) *Microbrontes blackburni* (Grouvelle)	.	.
Laemophloeus blackburni Grouvelle	Yes	.
Laemophloeus frenchi Blackburn	,,	.
(8) *Microbrontes lineatus* (Broun)	.	.
Tularthrum lineatum Broun	Yes	.
(9) *Dysmerus basalis* Casey	No	One series of 4 specimens.
Laemophloeus caseyi Grouvelle	Yes	.
Dasymerus sulcicollis Grouvelle	,,	.

AN INTERESTING NEW GENUS OF SCELIONIDAE FROM S.W. AFRICA (HYMENOPTERA : PROCTOTRUPOIDEA)

By Lubomir Masner

(*Czechoslovak Academy of Science, Department of Insect Pathology, Prague*)

[Communicated by Mr. G. E. J. Nixon]

Through the kindness of Mr. G. E. J. Nixon of the Commonwealth Institute of Entomology, London, I received a Scelionid which beyond doubt represents a new and highly interesting genus. As Mr. Nixon himself believed it to be new, he asked me if I would care to describe it.

It gives me great pleasure to dedicate this new genus to Mr. Nixon in recognition of the valuable advice and friendly help I have had from him.

Subfamily Scelioninae

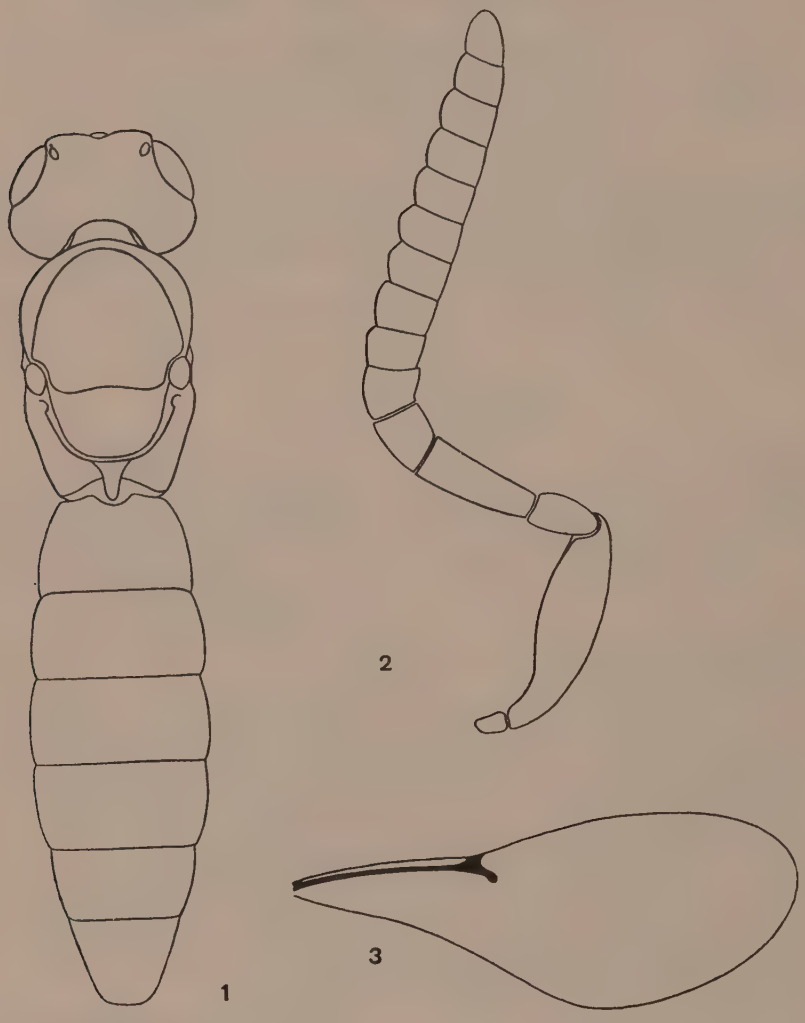
Nixonia gen. n.

Female.—In general habitus resembling *Scelio* Latr. and related genera. Body cylindrical and distinctly lengthened. Head rounded, transverse, somewhat wider than the thorax. Eyes large, bare. Ocelli forming a triangle; lateral almost touching the eye-margin; median situated far forwards. Frons slightly gibbose, simple. Maxillary palpi 4-segmented; labial 2-segmented. Vertex rounded, not carinated. Antenna inserted close to the mouth, 14-segmented and without a distinct club. Prothorax well developed laterally. Mesoscutum as long as wide; parapsidal furrows entirely absent. Scutellum unarmed, rounded posteriorly. Metanotum unarmed, very narrow and in the form of an inconspicuous band. Posterior corners of propodeum blunt; medially the propodeum shows a large, tooth-like projection. Wings like those of *Scelio* Latr., not surpassing the abdomen; subcosta covering basal third of wing-length, distally showing as a small darkened spot; stigmalis slightly oblique, knobbed distally; marginalis punctiform; postmarginalis wanting; fringe microscopical; hind wing with distinct submarginal vein, bearing apically 3 frenal hooks. Legs slender; spurs 1, 2, 2; front spur simple, bearing no accessory teeth; tarsi 5-segmented; hind metatarsus laterally somewhat compressed, stout, shorter than remaining segments combined; claws simple. Abdomen like that of *Scelio*, longer than head and thorax united, composed of 6 visible tergites and 6 sternites; all segments of nearly equal length, transverse, excepting the terminal one which is bluntly triangular, and nearly as long as wide; first tergite without a horn-like projection.

Type-species: *Nixonia pretiosa* sp. n., described below.

This remarkable genus can hardly be compared with any of the living genera of Scelionidae for the striking number of antennal segments is a unique character. As far as the author is aware, not one of the several hundred living Scelionid genera possesses more than 12 segments in the female antenna. Among fossils, however, we find two genera characterised by a 14-segmented antenna, namely, *Proteroscelio* Brues and *Archaeoscelio* Brues. The first is from the Canadian cretaceous amber (Brues, 1937), the second from the oligocene Baltic amber (Brues, 1940). Both are quite different from *Nixonia*. *Archaeoscelio* seems to be very far removed not only from recent genera but also from the other known fossil Scelionidae. From *Archaeoscelio* Brues, *Nixonia* differs chiefly

in its very different wing venation, shape of scutellum, abdomen, *etc.* The most important differences between *Nixonia* and *Proteroscelio* Brues are the absence of a postmarginalis in *Nixonia* as well as its considerably gibbose head and

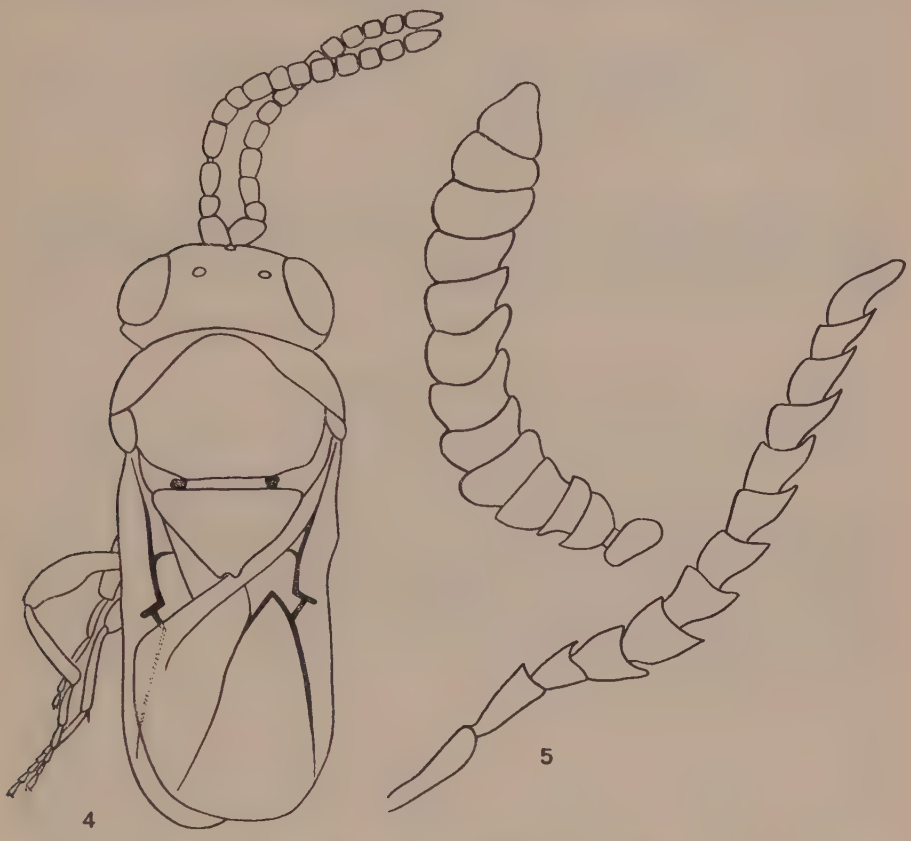


Figs. 1–3.—*Nixonia pretiosa* gen. et sp. n. (holotype): (1) body; (2) right antenna; (3) fore wing.

thorax. Furthermore, the antennae in *Nixonia* are not depressed and enlarged as in *Proteroscelio*. Both fossils are shown in figures 4 and 5.

The author is not inclined to consider the similar number of antennal segments in *Nixonia* and the above mentioned fossils as more than convergence and believes them to be without important phylogenetic significance. It is not easy to suggest the affinities of the genus. With regard to general shape and

wing venation it comes nearest to the complex of genera that includes *Scelio* Latr., *Oreiscelio* Kieffer, *Enneascelio* Kieffer, *etc.* From a phylogenetical point of view, *Nixonia* seems to represent a somewhat archaic and ancestral type in the Scelionidae.



Figs. 4–5.—(4) *Archaeoscelio rugosus* Brues. Female. (After Brues, 1940). (5) *Proteroscelio antennalis* Brues. Female antenna in dorsal and lateral aspect. (After Brues, 1937.)

Nixonia pretiosa sp. n.

Female.—Head, prosternum, coxae of all legs, mesopleurae and propodeum, black. Tooth of propodeum brownish. Scape and two following antennal segments dirty yellow-brown ; remaining segments dark brown. Prothorax, mesoscutum, scutellum, tegulae and legs deep orange. Abdomen black, along the sutures reddish-brown. Wings slightly infuscated, especially at middle ; veins dark brown.

Head transverse, 103 : 67, shining, regularly reticulate throughout. Scape oblong, somewhat enlarged distally ; pedicel oblong, 13 : 7 ; third segment the longest, 22 : 8 ; following segments slightly transverse, the sixth being the widest. Pronotum reticulate ; propleurae longitudinally striated. Only a single suture joining tegula with fore coxa. Mesoscutum slightly wider than long, 80 : 72, finely reticulate. Scutellum with longitudinal rugae. Mesepimeron finely punctured ; mesepisternum with same longitudinal striation

as on propleurae, ending above, near tegulae, in an acute tooth. Metanotum very narrow; metapleurae with weak longitudinal striation. Propodeum extensively covered by silvery hairs. Wings reaching or slightly surpassing posterior end of fourth abdominal tergite. First abdominal tergite trapezoidal in shape, wider than long, 75 : 45; second transverse, 90 : 50, like the third; fourth transverse, 90 : 48; fifth transverse, 82 : 45; sixth slightly transverse, 60 : 55, blunt posteriorly; all tergites longitudinally striated throughout.

Length: 5 mm.

SW. Africa: Okahandja, 13–19.i.1928, 1 ♀, *holotype* (*R. E. Turner*). Type in British Museum (Nat. Hist.).

Summary

A new Scelionid genus *Nixonia*, subfamily Scelioninae, from SW. Africa is described, with *pretiosa* sp. n. designated as type-species. The relationships and systematic position of *Nixonia* are discussed.

References

Brues, Ch. T., 1937, Insects and Arachnids from Canadian amber, superfamily Serphoidea. *Univ. Toronto Stud.* (*Geol.*) **40** : 33–44.

—— 1940, Fossil parasitic Hymenoptera of the family Scelionidae from Baltic amber. *Proc. Amer. Acad. Arts Sci.* **74** : 70–90.

Kieffer, J. J., 1926, *Scelionidae*. In *Das Tierreich* **48**. Leipzig u. Berlin.

Muesebeck, C. F. W. and Walkley, L. M., 1956, Type species of the genera and subgenera of parasitic wasps comprising the superfamily Proctotrupoidea (Order Hymenoptera). *Proc. U.S. nat. Mus.* **105** : 319–419.

Statz, G., 1938, Neue Funde parasitischer Hymenopteren aus dem Terziär von Rott am Siebengebirge. *Decheniana* **98**A : 71–144.

Walker, T. L., 1934, Contributions to Canadian mineralogy, 1934. *Univ. Toronto Stud.* (*Geol.*) **36**, Pl. 1, fig. 2.

LECTOTYPES OF MOSQUITOES (DIPTERA: CULICIDAE) IN THE BRITISH MUSEUM

Part III. Genera *Sabethes*, *Udaya* and *Aëdes* (Subgenera *Paraëdes*, *Cancraëdes* and *Skusea*)

By P. F. Mattingly

(*British Museum, Natural History*)

The British Museum has many species of mosquitoes the types of which consist either of a series of two or more syntypes or of unique specimens marked as the type but not published as such. The present is the third of a series of papers in which it is hoped to remedy this situation.

Genus *SABETHES* Robineau-Desvoidy

Sabethoides confusus Theobald, 1903, *Monogr. Culic.* **3**: 328. See below under *Sabethes nitidus*.

Sabethes nitidus Theobald, 1901, *Monogr. Culic.* **2**: 347.

Theobald (1901: 347) described this species from "several ♀'s and a single ♂". The British Museum has the ♂ and 2 of his ♀. One of the ♀ was marked by Theobald as the type but not published as such. On the previous page he described another ♀ under the name *Sabethes remipes* Wiedemann. Subsequently (Theobald, 1903: 328) he noted that "The two ♀'s described as ♀ *remipes* and *nitidus* are both the same", and he therefore united them "under the name I now propose, viz., *confusus*". A description of "*Sabethoides confusus*" follows, at the end of which he says "I have carefully examined the types of ♀ *remipes* and ♀ *nitidus* and am sure they are the same . . .". The identity of the specimen intended by Theobald as the type of *S. nitidus* is thus not in doubt and I have marked it as the holotype of this species. That he intended the same specimen to stand as the type of *S. confusus* is also indicated by his subsequent statement (Theobald, 1910: 584) that the type of this species is in the British Museum, although he did not, in fact, mark it as such. I have therefore marked the same specimen as the holotype of *S. nitidus* and the holo-lectotype of *S. confusus*. Data for this specimen are "Para, Dr. Durham".

Genus *UDAYA* Thurman

Paraëdes subgenus *Udaya* Thurman, 1954, *Mosq. News* **14**: 83.

Genus *Udaya* Thurman of Mattingly, 1958, *Cul. Mosq. Indomalayan Area*, **3**: 4 and *Proc. R. ent. Soc. Lond.* (B) **27**: 79.

This group was proposed by Thurman as a monotypic subgenus to include *Paraëdes argyrurus* Edwards, mainly because of the very distinctive male terminalia. A further study of *Paraëdes* s. str. (Mattingly, 1958*a*: 19) has revealed so many differences from *Udaya* that I have preferred to treat the latter as a distinct genus. It appears to be annectent between *Aëdes* and the sabethine

group of genera, and it is possible that when it is more fully known it may be desirable to treat it as a subgenus of *Aëdes* (Mattingly, 1958*b* : 79). For further discussion see below under *Paraëdes*.

Paraëdes (?) *argyrurus* Edwards, 1934, *in* Barraud, *Faun. Brit. Ind. Dipt.* **5** : 448.

Described from 2 ♀ from the same locality, both in the British Museum. There appears to be no doubt that they are conspecific. One lacks the abdomen ; the other is in relatively good condition and more or less complete. I have therefore marked it as the hololectotype. I have marked the incomplete specimen as a paratype. Data for the holotype are " Nongpoh, Assam, 14.vi.1921, S. R. Christophers " and it is numbered 2674. Data for the paratype are the same except that it is dated iii.1927. It is numbered 2675.

Genus *AËDES* Meigen

Subgenus *Paraëdes* Edwards

Paraëdes Edwards, 1934, *in* Barraud, *Faun. Brit. Ind. Dipt.* **5** : 446.

This was described as a distinct genus mainly because Edwards believed that the two included species both lacked a squamal fringe in both sexes. In fact the female of *Paraëdes barraudi* Edwards was unknown to him while the absence of a squamal fringe from his female specimens was an artefact (Mattingly, 1958*b* : 80). The female of *P. barraudi* is still unknown but other related species have been discovered and these prove to have a well developed squamal fringe in the female (though not in the male) (Mattingly, 1958*a* : 4). A similar form of sexual dimorphism has been found in *Aëdes* subgenus *Cancraëdes* (Mattingly 1958*a* : 5) and the fringe is almost completely lost in males of subgenus *Rhinoskusea* (Mattingly, 1958*a* : 5). *Paraëdes* has thus proved to be no more than a subgenus of *Aëdes*.

Paraëdes barraudi Edwards, 1934, *in* Barraud, *Faun. Brit. Ind. Dipt.* **5** : 447.

Described from 2 ♂ with identical data, both in the British Museum. They are undoubtedly conspecific. Both were dissected by Edwards. I have marked the better of the two as hololectotype and the other as a paratype. Data for both are "Coorg, Virajpet, S. India, vi.1927, J. D. Baily ". The holotype is numbered 2673 and the paratype 2672.

Aioretomyia ostentatio Leicester, 1908, *Stud. Inst. med. Res. F.M.S.* **3** (3) : 193.

Described from " a series of females ". These are now represented only by 2 ♀ in the British Museum, marked as cotypes. Two other ♀, not so marked, belong to a distinct new species (Mattingly, 1958*a* : 29). Of the two cotypes one is very incomplete. I have therefore marked the other as hololectotype and the incomplete one as a paratype. Data for the holotype are " Patch of jungle, 4½ miles, Pahang Rd., Kuala Lumpur, 21.ix.1903 " and for the paratype " Jungle, 5th mile, Gombak Road, 5.ii.1904 ". This species has long been treated as a *species incertae sedis* but it is in fact a perfectly typical *Paraëdes*. *Aë. pagei* Ludlow has been regarded as synonymous but is in fact quite distinct.

Subgenus *Cancraëdes* Edwards

The suppression of the male squamal fringe has been noted above. There are also a number of very good subgeneric characters in all stages which have previously been overlooked (*see* Mattingly, 1958*a* : 42, 1958*b* : 80).

Aëdes cancricomes Edwards, 1922, *Indian J. med. Res.* **10** : 272, 1922.

This species was originally placed in *Skusea* but was later chosen as the type species of *Cancraëdes* (Edwards, 1929 : 342). The original description was based on a holotype ♂ in the British Museum, and 1 paratype ♂ and 1 paratype ♀ said to be shared between the British Museum and the Central Malaria Bureau, Kasauli. In fact the British Museum has 1 ♂ and 2 ♀, all sent at the same time as the holotype and therefore available to Edwards at the time he made his description. One of the ♀ lacks the abdomen and may have been omitted by him for this reason. I have marked the remaining ♀ as allotype and the ♂ as a paratype. The British Museum also has a number of other ♀ and a ♂, but these were sent later and cannot have been included in the original description. (The ♂ was sent as *Aë. simplex*, but see below.) Data for the holotype and allotype are " Andaman Is., Port Blair, ix.1915, S. R. Christophers ". The paratype should probably have the same data but these were apparently not sent. This specimen is very incomplete but has associated terminalia on which Edwards apparently based his drawing. The holotype is undissected. This species is confined to the Andamans and is the only species occurring there. Other records are erroneous (Mattingly, 1958*a* : 44).

Ficalbia simplex Theobald, 1903, *Monogr. Culic.* **3** : 297.

Described from a unique ♂ from Ceylon, in the British Museum. I have marked this as holotype. Theobald (1910 : 541) later described 2 ♀ which he designated as allotypes although he only marked one of them as type. Both of these are in the British Museum and I have marked the one chosen by Theobald as allotype since it appears as such in the literature and seems to be conspecific with the holotype. However, its value as a type specimen seems to me very dubious. This species is confined to Ceylon and other records are erroneous (Mattingly, 1958*b* : 80).

Aëdes curtipes Edwards, 1915, *Bull. ent. Res.* **5** : 283.

Described from, *inter alia*, " 2 ♀ (including type) from the old Sarawak Museum collection ". These are in the British Museum and one was marked as type by Edwards. I have marked this as the holotype. Data for both specimens are " Sarawak, Kuching (?) ". Edwards also included a specimen from Membakut, N. Borneo, in his description and I have marked this and the second Sarawak specimen as paratypes. The specimen from Klang, Selangor, which Edwards included in his description belongs to a different species, described elsewhere (Mattingly, 1958*a* : 51).

Subgenus *Skusea* Theobald

This formerly included a number of species now otherwise disposed. It was restricted by Edwards (1929 : 340).

Stegomyia fusca Leicester, 1908, *Stud. Inst. med. Res. F.M.S.* **3** (3) : 92.

This species was relegated to the synonymy of *Aë.* (*Skusea*) *amesi* Ludlow by Knight & Hull (1952 : 158). In addition to the three cotypes which they mention, the British Museum has a fourth specimen marked as such but possibly included in the cotype series in error since its data do not agree with those attached to the other specimens or those published by Leicester. This specimen is a *Cancraëdes* (Mattingly, 1958*a* : 51). The other cotypes comprise 2 ♂ and 1 ♀. One of the ♂ has the abdomen missing and I have marked this as a paratype and the other as hololectotype. I have marked the ♀ as allotype. Data for the ♂ are " Taken among atap palms by the railway at Klang, 6.i.04 " (holotype) and " Near river bank, Klang, 6.i.04 " (paratype). Both bear the number 64. The allotype has the same number and bears the data " Larva from atap palm, Port Swettenham, 6.i.04 ".

Aëdes pembaensis Theobald, 1901, *Monogr. Culic.* **2** : 235.

Described from a unique ♀ holotype which is in the British Museum.

Aëdes (*Skusea*) *fumidus* Edwards, 1928, *Bull. ent. Res.* **7** : 274.

Edwards marked a ♂ as type although he did not publish it as such. I have marked this specimen as the holotype. Data are " Singapore, D. H. C. Given ". The type series contains one other ♂ and 4 ♀ which I have marked as paratypes except for one ♀ marked as allotype. Data for these specimens are the same as for the holotype except that the allotype bears the additional data " Bred from fallen tree trunk ".

References

Barraud, P. J., 1934, *The fauna of British India. Diptera*, **5** (*Culicidae : Megarhinini and Culicini*). London.

Edwards, F. W., 1915, Diagnoses of new Bornean Culicidae. *Bull. ent. Res.* **5** : 283–5.

—— 1922, A synopsis of adult oriental culicine (including megarhinine and sabethine) mosquitoes. Part I. *Indian J. med. Res.* **10** : 249–93.

—— 1928, Mosquito Notes, VII. *Bull. ent. Res.* **18** : 267–84.

—— 1929, Mosquito Notes, VIII. *Ibid.* **20** : 321–43.

Knight, K. L. and Hull, W. B., 1952, The *Aëdes* mosquitoes of the Philippine Islands, II. *Pacif. Sci.* **6** : 157–187.

Leicester, G. F., 1908, The Culicidae of Malaya. *Stud. Inst. med. Res. F.M.S.* **3** (3) : 18–261.

Mattingly, P. F., 1958*a*, *The culicine mosquitoes of the Indomalayan area.* Part III. Genus *Aëdes* Meigen, subgenera *Paraëdes* Edwards, *Rhinoskusea* Edwards and *Cancraëdes* Edwards. London : Brit. Mus. (Nat. Hist.).

—— 1958*b*, A revision of *Paraëdes* Edwards and *Cancraëdes* Edwards (Diptera : Culicidae). *Proc. R. ent. Soc. Lond.* (B) **27** : 76–83.

Theobald, F. V., 1901, *A monograph of the Culicidae or mosquitoes*, **1**. London : Brit. Mus. (Nat. Hist.).

—— 1903, *Ibid.* **3**.

—— 1910, *Ibid.* **5**.

Thurman, D. C., 1954, The discovery of *Paraëdes* (*Udaya*) *argyrurus* Edwards, 1934, in Thailand (Diptera : Culicidae). *Mosquito News.* **14** : 83–86.

TWO NEW SPECIES OF *KALOTERMES* HAGEN FROM WEST AFRICA (ISOPTERA : KALOTERMITIDAE)

By W. Wilkinson
(*Colonial Termite Research Unit*)

Two species are described here from material collected during a tour of duty in West Africa. They belong to a new group, possibly deserving generic rank, but are placed provisionally in *Kalotermes* Hagen until such time as all the Ethiopian termites ascribed to the genus can be revised together.

Kalotermes spinicollis sp. n.

Imago (fig. 1, A–F).—Head capsule pale yellow-brown with distinct sepia streak beneath eye, a parallel one running back from upper margin of eye, vertex suffused with same colour; lightly reticulate but shining; one large bristle close to hind margin of eye, and one on epicranial plate, as figured. Eyes very large, moderately convex. Ocelli round, or very short oval; touching eyes. Antennae pale, 12–14 segmented, the segments becoming increasingly elongate distally, third not greatly different from second or fourth. Clypeus pale; labrum yellow. Mandibles as depicted.

Pronotum pale yellow-brown; sides rounded, converging posteriorly; fringed with minute setae, with 3–5 (normally 4) prominent bristles on side margin, one on notum towards posterior corner, and sometimes one on front margin. Remainder of thorax and legs pallid, except tibiae, tarsi and sagittal lines on meso- and metascuta which are yellow-brown; several very long outstanding bristles, including one on each mid and hind tibia, one-quarter to one-half its length, set variably on its anterior face about two-fifths from proximal end. Wings hyaline, scale costa and radial sector yellow-brown; membrane indistinctly papillate; *Kalotermes*-pattern venation. Abdominal tergites bright brownish-yellow, sternites very little paler; side and hind margins of plates with several long bristles.

	Mean (mm.)	Range (mm.)
Length of head to front angles	1·03	0·96–1·13
Width of head across eyes	1·09	0·99–1·13
Length of ocellus	0·11	0·10–0·14
Width of ocellus	0·10	0·09–0·11
Greatest diameter of eye	0·43	0·41–0·45
Maximum length of pronotum	0·62	0·58–0·68
Maximum width of pronotum	0.99	0·93–1·04
Length of fore wing	7·6	7·3–7·9
Width of fore wing	2·2	2·0–2·3
Length of hind tibia	0·85	0·79–0·90

The measurements are of 25 specimens, including the single one from Kumasi, which is slightly larger than those from the type locality.

Soldier (fig. 1, G–N).—Head capsule yellow-brown posteriorly, grading forward to red-brown, with front part, including antennal carinae and latero-frontal lobes, almost black; surface dull owing to fine granulation, less so towards occiput; setae minute and very sparse. Capsule very short, about one and one-quarter times longer than broad. Postclypeus and frons rise steeply in mid-line, slope levelling abruptly well before epicranial suture;

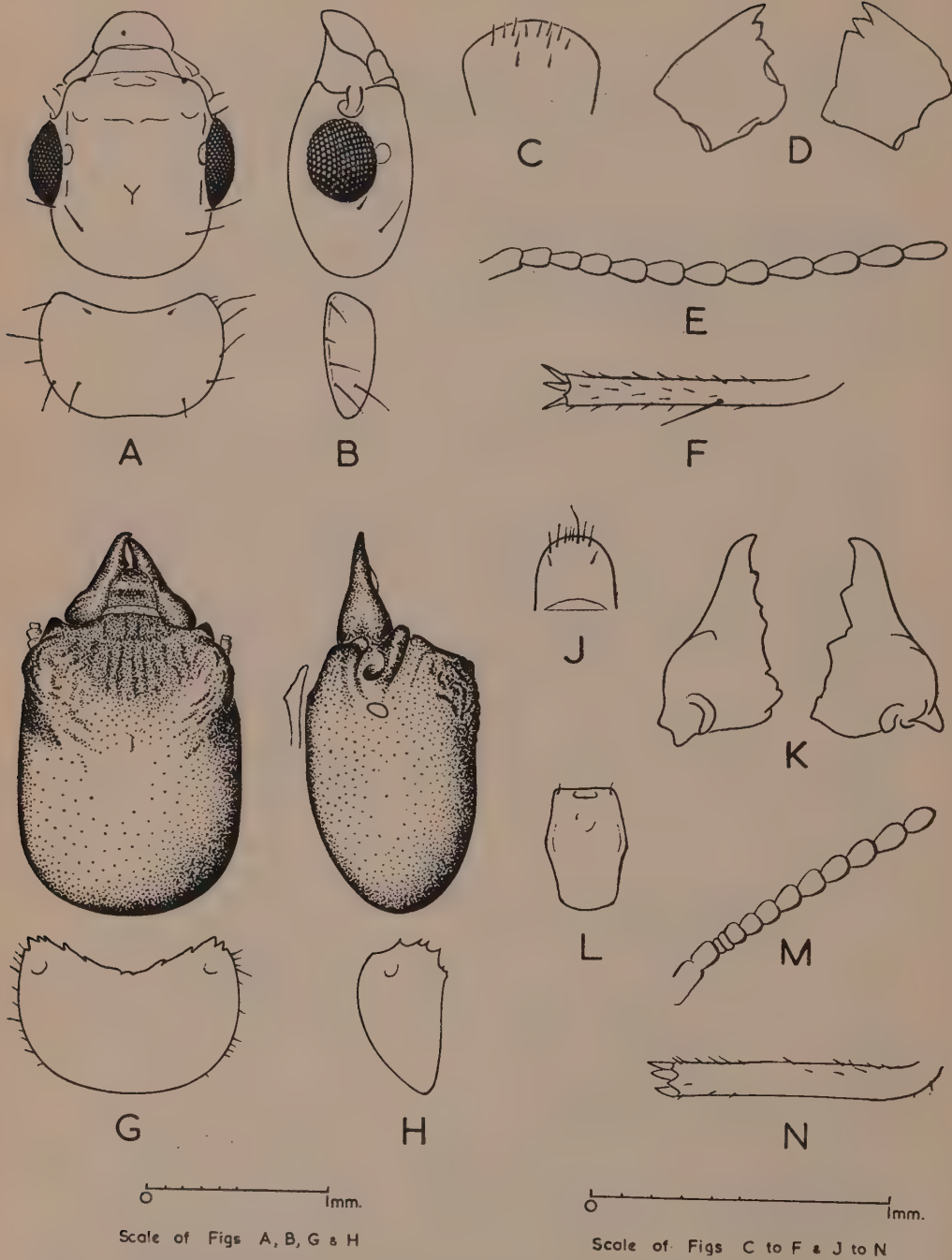


FIG. 1.—*Kalotermes spinicollis* sp. n. *A–F*, Imago: *A*, head and pronotum from above; *B*, head and pronotum from side; *C*, labrum; *D*, mandibles; *E*, antenna; *F*, anterior face of left hind tibia. *G–N*, Soldier: *G*, head and pronotum from above; *H*, head and pronotum from side; *J*, labrum; *K*, mandibles; *L*, postmentum; *M*, antenna; *N*, anterior face of left hind tibia.

light longitudinal ridging interrupted by depressed clypeo-frontal suture : latero-frontal areas raised into prominent, rounded lobes, lightly rugose, tending to striate ; peaks of lobes almost vertically over base of antennae, continued back as broad ridges merging into epicranial plates midway along length of head ; anterior corners of frons drawn forward into supra-mandibular projections ; these, linked to antennal carinae, form distinct horizontal ribs. Genae or mandibular sclerites attenuated in front over mandibular abductors into processes which are continued backwards as ridges ending just below eyes. Eyes pale, unfacetted. Ocelli absent. Antennae yellow-brown ; 13, sometimes 12 or 14 segmented ; third segment normally very transverse, but if elongate never longer than second ; succeeding ones transverse to elongate. Labrum brown ; apical setae prominent. Anteclypeus yellowish. Mandibles dark brown, nearly black distally ; granulate at base ; dentition figured. Postmentum yellow-brown, centre and side margins darker ; a clearly raised boss in midline towards front ; shaped as figured.

Pronotum yellow-brown ; finely granulate, setae sparse and small, longer on margins ; front edge emarginate, upturned and very deeply serrate, a lump towards each antero-lateral corner, postero-lateral corners broadly rounded. Meso- and metanota very pale yellow-brown ; unusually broad, wrapped down side of thorax. Remainder of thorax and legs yellow-brown, tibial spurs darker. Abdomen creamy.

	Mean (mm.)	Range (mm.)
Length of head to front angles*	1·51	1·40–1·60
Maximum head width	1·25	1·20–1·29
Width of head at front angles*	1·09	1·03–1·13
Maximum head depth	0·97	0·90–1·02
Length of left mandible	0·74	0·70–0·78
Maximum length of pronotum	0·81	0·74–0·90
Maximum width of pronotum	1·26	1·22–1·29
Length of hind tibia	0·85	0·81–0·89

* " Front angles " = tips of genal processes.

The measurements are of 20 specimens, 15 from the type locality and 5 from Kumasi.

Relationships.—K. spinicollis is closely allied to *K. exsertifrons* sp. n., the differences being described in the account of that species. Together the two form a distinct group unlikely to be confused with any other members of the genus.

The eyes of the alate are much larger than those of the other African *Kalotermes*, and the number of antennal segments less. From the relatively large-eyed *Epicalotermes* (*aethiopicus*, *kempae*, *mkuzii* and *munroi*) it is further distinguishable by the posteriorly rounded pronotum, by the prominent bristles, and by the mandible having an only slightly elongated anterior edge to the second marginal tooth of the left mandible. The bicoloured head is also distinctive, and the effect to the naked eye of a brown head and bright yellowish abdomen renders recognition in the field possible.

In its short head and raised frontal lobes the soldier resembles only *exsertifrons* among the *Kalotermes*, but may be mistaken initially for a *Cryptotermes*. The strong pronotal serrations serve as an easy means of separation, but the heads are also constructed differently. In the *Cryptotermes* known from Africa the antennal carina is absorbed by a downward extension of the frontal flange, and any link with the supra-mandibular projections obliterated.

Furthermore, in the *C. havilandi* group and *C. brevis* the postmentum is much shorter, and broadest posteriorly, the mandibles also being of different form and upturned. The mandibles of *C. dudleyi* are more or less horizontal, but their dentition is sufficiently distinctive to use as a character.

Material.—Holotype: alate female. British Museum (Natural History). Allotype: alate male. British Museum (Natural History). Morphotype: soldier. British Museum (Natural History).

Type colony.—NIGERIA: Eastern Region; Nkpoku (12 miles from Port Harcourt on the Owerri road). Fresh water swamp forest. In dead side of tree (? *Albizzia ferruginea*),[1] 10 feet from ground. 18.xii.1957 (WW.925).

Other records.—NIGERIA: data as type colony, viii.1957 (WW.784, WW.798, WW.800); xii.1957 (WW.926). GHANA: Kumasi, xi.1957 (WW.865, WW.866).

Bionomics

Distribution.—In addition to the Nkpoku and Kumasi records, specimens collected at Kakoma, Tanganyika (32° 25′ E., 5° 50′ S.) by Miss P. B. Kemp in ix.1948 (K.1.225) are provisionally ascribed to this species, though not given paratype status. The soldier is larger and the thickenings of the head capsule less pronounced.

Workings.—Found each time in small elongate galleries in hard dead tree trunks.

Alate production.—Winged reproductives were found on both occasions the species was taken at Nkpoku, in August and December.

Kalotermes exsertifrons sp. n.

Imago (fig. 2, A–F).—The specimens are so like the imagines of *K. spinicollis* as to make a general description in the same paper repetitive. Until more material is available it is not possible to separate the two decisively, as the points of difference may prove to lack constancy. These are based on the two dealate reproductives and a single, probably conspecific, alate. The pronota are appreciably longer than those of *spinicollis*, and lack the 2 posterior bristles. The very long mid and hind tibial bristles so prominent in the last species are absent, or reduced to the same length as the other setae. The epicranial bristles are also absent or reduced. The antennae of the alate are 14 and 15 segmented (*c.f.* 12–14), and the wings larger than the biggest known *spinicollis* ones, but both these characters could be encompassed by the range of normal variation in a long series.

	Type (mm.)	Allotype (mm.)	Paratype (No. 365) (mm.)
Length of head to front angles	1·02	1·02	0·99
Width of head across eyes	1·09	1·09	1·07
Length of ocellus	0·10	0·11	0·11
Width of ocellus	0·09	0·11	0·10
Greatest diameter of eye	0·45	0·44	0·43
Maximum length of pronotum	0·70	0·71	0·71
Maximum width of pronotum	0·97	1·01	0·97
Length of fore wing	.	.	8·2
Width of fore wing	.	.	2·3
Length of hind tibia	0·88	0·83	0·87

[1] See footnote on page 115.

Soldier (fig. 2, G–N).—Head capsule yellow-brown posteriorly, anterior part including frontal lobes, antennal carinae and anterior genae darker red-brown; surface dulled by fine granulation, coarsening towards front; setae very few and very small. Capsule short, not more than one and one-quarter times longer than broad; parallel-sided or diverging posteriorly. Depressed clypeofrontal suture separates clypeus from frons, which rises steeply in mid-line for first half of its length, slope then easing to epicranial suture; on each side close to this point a ridge arises, running forward approximately along arms of epicranial suture, then broadening into large, weakly rugose, latero-frontal lobes, slightly cowled in front; frons below cowl descends very steeply to supra-mandibular projections, these linked by folds to antennal carinae. Genae drawn out over mandibular abductors into processes which form ends to ridges curving below and round antennal fossae, ending below eyes. Eyes pale, unfacetted. Ocelli absent. Antennae pale yellow-brown or pallid; 12, sometimes 11 or 13 segmented; third segment very transverse to quadrate, never longer than second; remaining ones transverse becoming elongate, as shown. Labrum yellow-brown with distinct apical setae; anteclypeus pallid. Mandibles brown, tips darker; weakly granulate and reticulate at base and on outer edge; dentition figured. Postmentum brown; sides rather sharply angled in middle due to their being folded in towards front.

Pronotum pale yellow-brown; finely granulate, setae small and sparse, longer on side margins; front edge emarginate, sharply upturned and serrate; postero-lateral corners broadly rounded, sometimes somewhat flattened. Meso- and metanota pallid, very broad. Remainder of thorax and legs very pale yellow-brown, tibial spurs and claws darker; hind tibiae distinctly curved. Abdomen almost white.

	Mean (mm.)	Range (mm.)
Length of head to front angles	1·34	1·24–1·43
Maximum head width	1·11	1·04–1·18
Width of head at front angles	0·98	0·95–1·04
Maximum head depth	0·90	0·83–0·97
Length of left mandible	0·68	0·64–0·72
Maximum length of pronotum	0·76	0·69–0·81
Maximum width of pronotum	1·07	0·99–1·12
Length of hind tibia	0·77	0·72–0·85

The measurements are of 20 specimens, 15 from the type locality and 5 from Port Harcourt.

Relationships.—*K. exsertifrons* is a close relative of *K. spinicollis*, and can be separated from other Kalotermitidae by the points given in the previous description.

The differences between the imagines of the two species are noted in the descriptive section.

The soldier of *exsertifrons* is paler and slightly the smaller of the two, but differs most obviously in the formation of the frontal lobes. These rise nearer the front of the head, the ridges being sharper and more raised. The forward development is greater, particularly towards the mid-line, resulting in a median cleft, relieved in its centre by concavities on the inner sides of the lobes. Each lobe is clearly, though shallowly, hooded in front, a feature not attained by *spinicollis*. The latter has, on average, one more antennal segment, and stronger pronotal serrations. The presence or absence of the postmental boss is not a reliable difference, but the folding in of the sides of this sclerite at the front is seen only in *exsertifrons*. The labrum is normally more attenuated in this species.

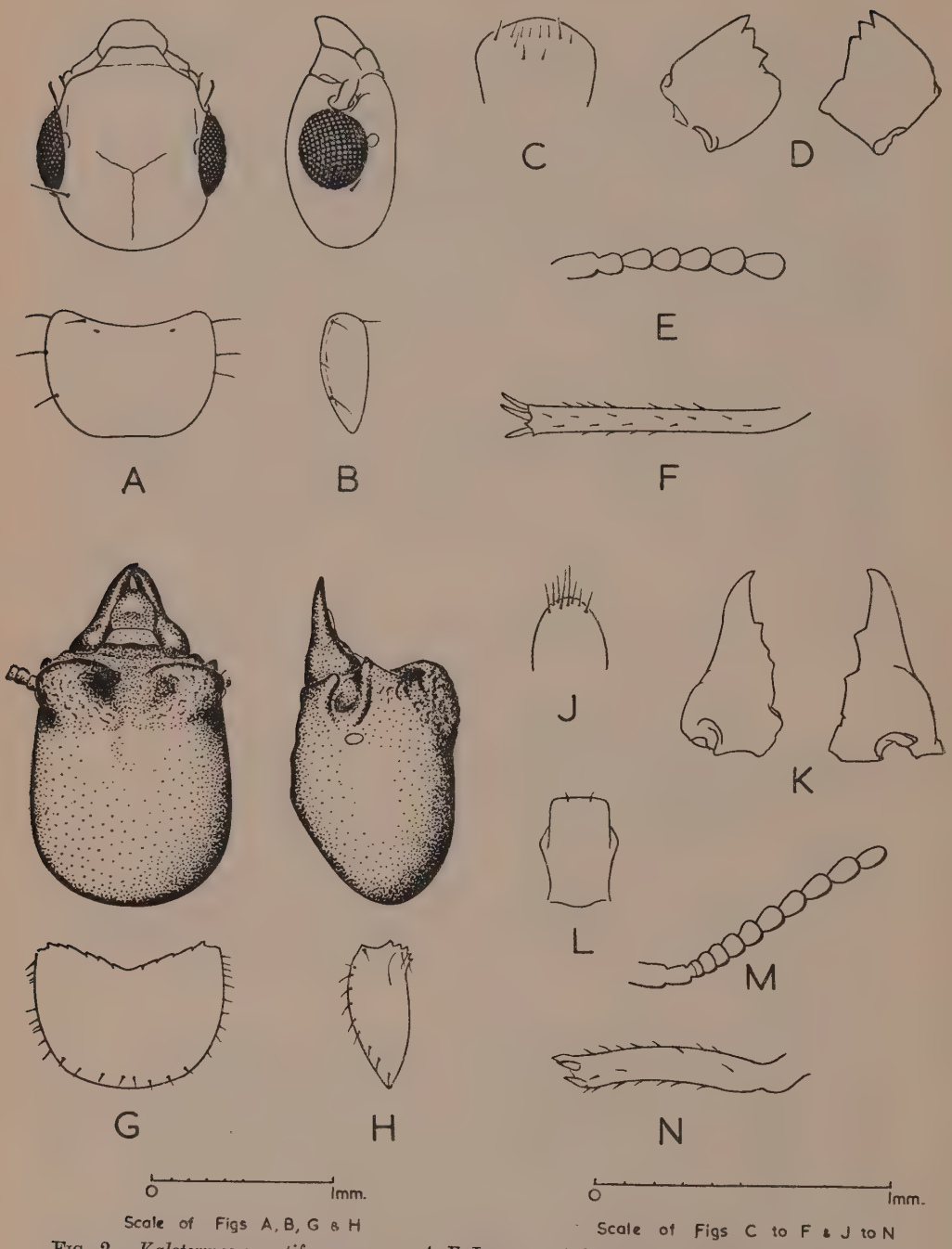


FIG. 2.—*Kalotermes exsertifrons* sp. n. *A–F*, Imago: *A*, head and pronotum from above; *B*, head and pronotum from side; *C*, labrum; *D*, mandibles; *E*, antenna; *F*, anterior face of left hind tibia. *G–N*, Soldier: *G*, head and pronotum from above; *H*, head and pronotum from side; *J*, labrum; *K*, mandibles; *L*, postmentum; *M*, antenna; *N*, anterior face of left hind tibia.

Material.—Holotype: dealate female. British Museum (Natural History). Allotype: dealate male. British Museum (Natural History). Morphotype: soldier. British Museum (Natural History).

Type colony.—Nigeria: Eastern Region; Nkpoku (12 miles from Port Harcourt on the Owerri road). Fresh water swamp forest. In dead tree (? *Albizzia ferruginea*),[1] 15 feet from ground. 13.viii.1957 (WW.792).

Other records.—Nigeria: data as type colony (WW.796, WW.799, WW.797 (Allotype), WW.801). Port Harcourt, xi.1956 (WW.365); xii.1957 (WW.912).

Bionomics

Distribution.—Known so far only from Nkpoku and Port Harcourt, Nigeria.

Workings.—Narrow galleries with occasional tangential flattened chambers in hard, dead tree trunks.

Colony organisation.—The soldier caste is not common, there being 1 for every 40 nymphs in those colonies counted. In the type colony the queen was originally physogastric and 9 mm. in length. She was in a flattened chamber and in undoubted association with 380 eggs in various stages of development, and many young nymphs. More eggs were lost in opening the wood, whilst others in adjoining galleries probably, but not certainly, belonged to her. It thus appears that a colony may attain a considerable population.

Alate production.—The single known alate was taken at light 1½ hours after dusk on 12.xi.1956, and must have flown for more than 50 yards on a windless night.

Acknowledgments

My thanks are due to the Forest Products Research Laboratory, Princes Risborough, for the identification of wood samples, and to the Trustees of the British Museum (Natural History) for facilities for taxonomic work.

[1] The tree from which both type colonies were taken had an extensive dead side. In addition to the *Kalotermes*, it harboured a *Cryptotermes* and two species of *Glyptotermes*, which will feature in a future paper.

A NEW SPECIES OF *PETALURA* LEACH (ODONATA) FROM WESTERN AUSTRALIA

By J. A. L. Watson

(*Zoology Department, University of Western Australia*)

[Communicated by Dr. E. P. Hodgkin]

The discovery in Western Australia of the first specimen of a new *Petalura* was reported recently (Watson, 1957). Subsequently, series of mature and newly emerged adults of both sexes and many exuviae were collected in two additional localities in the vicinity of Perth. These form the basis of the description of the new species, which may be called

Petalura hesperia sp. n.

(Derived from the Greek ἑσπερος—western)

These descriptions were prepared from live material. The terminology is that of Chao (1953).

Male.—Length 89–99 mm.

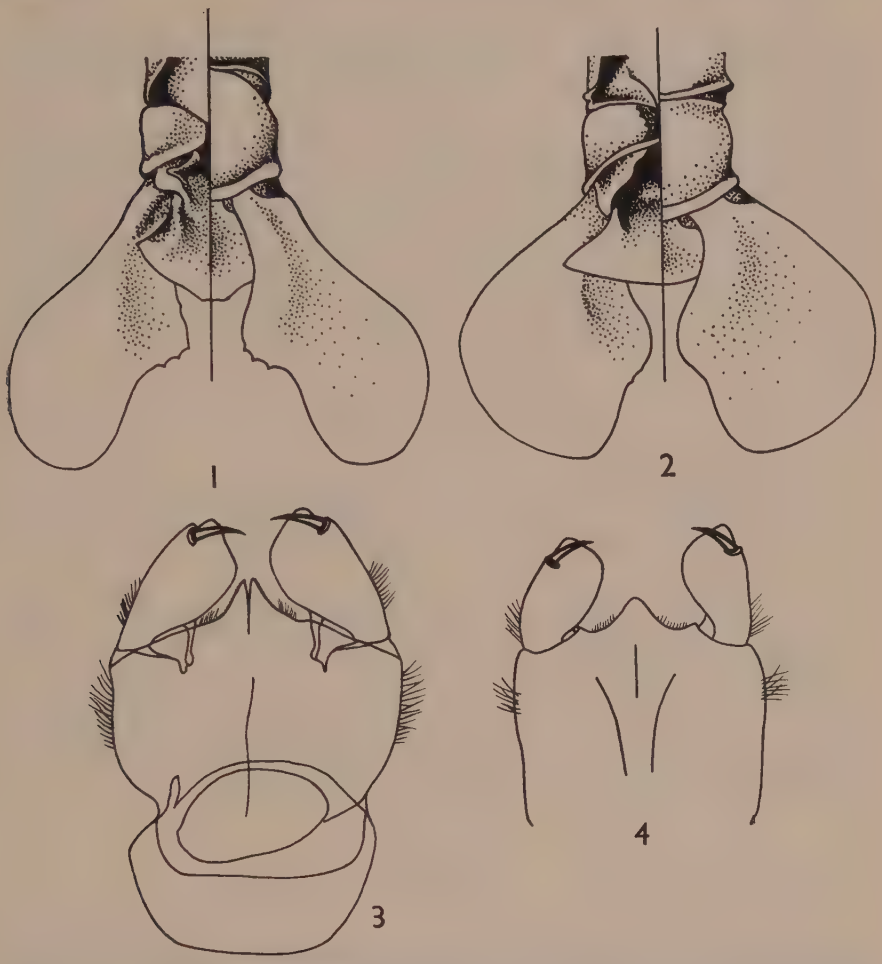
Head : vertex and occiput black, downy ; a pair of yellow spots behind ocelli and also on rear of occiput ; postocciput yellow above ; frons yellow-cream, bordered behind with blackish-brown and with fine black dorsolateral spots ; postclypeus yellow-cream, bordered below with black ; anteclypeus black ; labrum pale yellow, with black-brown lower border ; mandible black, pale yellow laterally ; labium pale yellowish-brown ; genae and postgenae black, yellow stripe bordering posterior margin of eye ; eye deep grey in life, red-brown in dried specimens.

Thorax downy, covered with fine pruinescence. Prothorax dark brown, pale edge to anterior lobe, small yellow nodule on episternum. Synthorax : anepisterna and epimera pale yellowish-brown, merging into dusky brown on edges and in sutures ; katepisterna dark brown, touched yellowish. Legs black, stout ; coxae each bearing a small yellow mark laterally. Wings : fore wing 51–55 mm., hind wing 49–53 mm.; similar to *P. gigantea* but membrane darkly pigmented along veins at base of wing, small patch of brown at nodus ; subtriangle of fore wing 3–6 celled, triangle of fore wing 3–4 celled ; nodal index :

9–12 : 17–19	16–19 : 8–11
9–11 : 13–15	14–16 : 8–12

Abdomen : length 66–75 mm.; thick at base, segments 4–10 more or less cylindrical ; lightly pruinescent, more densely so on segments 2–3 and 9. Segment 1 dark brown, hairy ; small lateral yellowish-brown patches ; narrow dorsal line or spot on basal third. Segment 2 dark brown above, shading into yellow-brown laterally ; auricle yellowish, posterior to auricle dark brown ; narrow mid-dorsal yellow line, posterior transverse carina variably touched with yellow ; accessory genitalia similar to *P. gigantea*. Segment 3 brown above ; laterally a yellowish mark reaching back past supplementary transverse carina ; dorsal stripe and posterior transverse carina as 2. Segment 4 as 3, but lateral yellowish patch narrower. Segment 5 as 4, but yellow patch reduced to dull spot astride supplementary transverse carina, or absent ; segments 6–7 as 5, yellow patch absent. Segment 8 black, yellow dorsal stripe continuous or broken, reaching only to middle of segment, posterior transverse carina variably touched with yellow. Segments 9–10 black, posterior transverse carina as 8 ; yellow in extreme angle of tergite 10.

Appendages (fig. 1): superior black, petaloid, ± 7 mm. long, 3·5 mm. broad, inner and apical borders crenulate; large inferior spine at extreme base. Inferior broader than long; black tipped yellow ventrally; basal half of dorsal surface black, distal yellow; lateral spine black.



Figs. 1–4.—(1–2) Male appendages, dorsal and ventral aspects of (1) *Petalura hesperia* sp. n. (holotype); (2) *P. gigantea* Leach. (3–4) Labium of last instar male larva of (3) *P. hesperia* sp. n. (paratype); (4) *P. gigantea* Leach (*after* Tillyard, 1909).

Female.—Length 82–96 mm.

Head and *thorax* as in male. Wings: similar to male; fore wing 53–58 mm., hind wing 51–56 mm., anal border rounded; nodal index:

9–10 : 20	14–16 : 10–11
11 : 15–17	18–20 : 9–10

Abdomen: stout, slightly tapering, pruinose. Segment 1 as male. Segment 2 as male, lacking auricles but with yellow stripe laterally, tapering to posterior. Segments 3–7 as male. Segments 8–10 short, dark brown above, yellow dorsal stripe absent; posterior

transverse carina black in 8, 9, yellow in 10; diffuse yellow dorsally on sutures. Supra-anal plate and inferior anal lamina tipped yellow. (The small yellow marks on segments 8–10 may be inconspicuous in dried material.)

Ovipositor: similar to *P. gigantea* but valves yellow laterally.

Appendages: as in *P. gigantea*.

Newly emerged forms of both sexes have the yellow and yellowish-brown areas brighter, dark brown eyes and, lacking pruinescence, appear glossy. Small yellow patches may be present laterally on Abd. 6.

Larva: final larval exuviae correlate closely in size and morphology with the descriptions and figures of *P. gigantea* given by Tillyard (1909, 1911). However, the tip of the labial mentum is deeply cleft in the new species, whereas it is figured by Tillyard (1909) as being entire in *P. gigantea* (see figs. 3, 4). Wolfe (1953) regards the cleft lobe as being characteristic of petalurid larvae. In *P. hesperia*, the cleft is closed and inconspicuous, and Tillyard may have failed to observe it in *P. gigantea*. A detailed description of the larva will be published later.

Holotype ♂, Western Australia: $1\frac{3}{4}$ m. south-west of Karragullen and $13\frac{1}{2}$ m. south-east of Perth (Grid reference 102294, Kelmscott 1 mile per inch map), 1.xii.1957 (*J. A. L. Watson*). No. 1958–3 in the Collection of the Western Australian Museum.

Allotype ♀, Western Australia: Bull Creek, Riverton, $6\frac{1}{2}$ m. south of Perth, 4.xii.1957 (*J. A. L. Watson*). No. 1958–4, W.A.M. Collection.

♂ *exuviae-allotype:* details as for allotype ♀. No. 1958–5, W.A.M. Collection.

♀ *exuviae-allotype:* locality as for allotype ♀, 7.xii.1957 (*J. A. L. Watson*). No. 1958–6, W.A.M. Collection.

Paratypes: Western Australia: 1 ♂, Lesmurdie, 13 m. east-south-east of Perth, x–xi.1956 (*M. Hawking*). 1 ♂, Karragullen, 30.xi.1957 (*J. A. L. Watson*). 4 ♂ (1 teneral), 1 ♀ (teneral), 20 exuviae (9 ♂, 11 ♀), Bull Creek, Riverton, 4.xii.1957 (*L. M. Saunders* and *J. A. L. Watson*). In the Collection of the Zoology Department, University of Western Australia.

Biology

The biology of *P. hesperia* appears to be similar to that of other petalurids, and more particularly that of *P. gigantea*. The original specimen was obtained in open fields adjacent to the boggy headwaters of Woodlupine Brook and, at Karragullen, the insects were found in a similar habitat, a permanent, partially cleared, swamp bordering a spring. The cleared portion was under grass, with isolated patches of *Scirpus* and *Gahnia*, but the uncleared area supported dense thicket of the tea tree *Agonis*. At Bull Creek, *P. hesperia* breeds in swampy ground alongside the creek itself. The swamp is densely vegetated with *Lepidosperma*, *Gahnia*, *Cladium* and other rushes under a broken tree cover of *Melaleuca*, *Agonis* and *Eucalyptus*, and contains a black peaty mud which is kept wet throughout the year by seepage from the adjacent hill slopes. The larvae form burrows in the mud and exuviae have been collected from the vegetation surrounding these, from ground level up to heights of 15 feet on the tree trunks. In the three localities, *P. hesperia* lives in association with other mud-dwelling Odonata: *Argiolestes pusillus* Tillyard, *Synthemis macrostigma*

occidentalis Tillyard, *Orthetrum caledonicum* (Brauer) and *Nannophya dalei occidentalis* (Tillyard).

Discussion and Diagnosis

Three species of the archaic Australian genus *Petalura* have been described previously, and descriptions or redescriptions of these may be found in Tillyard (1908, 1913) and Fraser (1933). *P. gigantea* Leach is known from the Blue Mountains, New South Wales, while *P. ingentissima* Tillyard and *P. pulcherrima* Tillyard are reported only from northern Queensland. *P. hesperia* may be distinguished from the two Queensland species by its smaller size and by the absence of yellow stripes on the thorax and yellow annulations on the abdomen. On morphological criteria it appears to be most closely allied to *P. gigantea* and comparative data on the two species are summarised in the table below. The information on *P. gigantea* is taken from Tillyard (1908, 1909, 1911) and from a specimen No. 6143 in the Collection of the Western Australian Museum, locality "Blue Mountains, N.S.W.", 16.xii.1908 (*R. J. Tillyard*).

Diagnosis of Petalura hesperia *sp. n. and* P. gigantea *Leach*

	P. hesperia	*P. gigantea*
Length . .	Male, 89–99 mm. Female, 82–96 mm.	Male, 87–97 mm. Female, 82–96 mm.
Postclypeus . .	Yellow, edged brown-black	Brown-black.
Prothorax . .	Posterior lobe blackish	Posterior lobe blackish; small yellow spot on posterior border.
Synthorax . .	Pale yellow-brown, dusky in sutures and on katepisterna	Dark brown, yellow stripes alongside dorsal carina, on mesepimeron and metepimeron.
Wings . . .	Dusky membrane along veins at base in male; spot at nodus	No darkening at base of veins in male; no spot at nodus.
Abdomen . .	Yellow laterally only to Abd. 4 or 5. Abd. 9 black	Yellow laterally to Abd. 10. Abd. 9 yellow above.
Male appendages .	Fig. 1	Fig. 2.
Distribution . .	Lesmurdie, Karragullen, Bull Creek, Western Australia	Blue Mountains and their southern and coastal spurs, New South Wales. Stradbroke Island, Queensland.
Habitat . .	Muddy or peaty swamps along or at head of streams; larvae in burrows among roots	"Tea tree" swamps at head of creeks; larvae in burrows in wet mud and vegetation; "summer dry".
Labium of larva .	Tip of mentum cleft (fig. 3)	Tip of mentum entire ? (fig. 4).

Summary

A fourth species of the archaic Australian genus *Petalura* is described. This new species, the first recorded from Western Australia, appears on morphological criteria to be most closely allied to *P. gigantea* Leach from New South Wales. The known biology is also similar to that of *P. gigantea*.

Acknowledgments

The author wishes to thank Dr. E. P. Hodgkin (University of Western Australia) for supervision of this work, and Dr. W. D. L. Ride (Western Australian Museum) for making available the specimen of *P. gigantea*. Receipt of a C.S.I.R.O. Honours Studentship and a research grant from the University of Western Australia is gratefully acknowledged.

References

Chao, H. F., 1953, The external morphology of the dragonfly *Onychogomphus ardens* Needham. *Smithson. misc. Coll.* **122** (6) : 1–56.

Fraser, F. C., 1933, Revision of the Fissilabioidea, Pt. II. *Mem. Indian Mus.* **9** : 203–50.

Tillyard, R. J., 1908, On the genus *Petalura*, with description of a new species. *Proc. Linn. Soc. N.S.W.* **32** (1907) : 708–18.

—— 1909, Studies in the life histories of Australian Odonata. I. The life history of *Petalura gigantea* Leach. *Ibid.* **34** : 256–67.

—— 1911, Studies in the life histories of Australian Odonata. IV. Further studies on the life history of *Petalura gigantea* Leach. *Ibid.* **36** : 86–96.

—— 1913, On some Australian Anisoptera, with descriptions of new species. *Ibid.* **37** (1912) : 572–84.

Watson, J. A. L., 1957, First record of a petalurid dragonfly from Western Australia. *W. Aust. Nat.* **6** : 79–81.

Wolfe, L. S., 1953, A study of the genus *Uropetala* Selys (Order Odonata) from New Zealand. *Trans. roy. Soc. N.Z.* **80** : 245–75.

DESCRIPTION OF A NEW SPECIES OF *ORTHOPODOMYIA* THEOBALD FROM MALAYA, WITH A NOTE ON THE GENUS IN THAT COUNTRY (DIPTERA : CULICIDAE)

By W. W. Macdonald

(*Institute for Medical Research, Kuala Lumpur, Malaya*)

The Malayan species of the genus *Orthopodomyia* Theobald, 1904 belong to the *anopheloides* subgroup, which was defined and reviewed by Knight and Mattingly (1950). Four species have been recorded from Malaya (*O. anopheloides* (Giles, 1903), *O. albipes* Leicester, 1904, *O. andamanensis* Barraud, 1934 and *O. maculipes* Theobald, 1910), but none of them could be described as common, and until recently only one species was represented in the collection at this Institute. During the past year, however, fairly extensive mosquito collections have been made in an area of primary and secondary forest some 15 miles north of Kuala Lumpur, at an altitude of about 1000 feet, where there are many patches of bamboo. In this area (Ulu Gombak Forest Reserve) all four species of *Orthopodomyia* have been found in larval collections together with a new species which is described below.

Orthopodomyia wilsoni sp. n.

Adult Male

Head : proboscis dark, with a narrow yellowish median ring and broad yellowish markings of variable extent apically ; palpus three-quarters to four-fifths length of proboscis ; dark with white rings on apex of I, over joint of II and III, at apices of III and IV, and round all of V ; a group of 4 or 5 stout setae arise from apex of IV, a few more slender ones from apex of III and from V ; torus clad with white ovoid scales ; the 5 basal flagellar segments with tufts of white elongate scales on inner side ; clypeus bare ; dorsum covered with narrow pale scales and many pale upright scales, the latter becoming darker towards vertex ; laterally a patch of broad white scales present, separated from upright scales by a patch of broad dark scales.

Thorax : scutum with numerous acrostichal and dorsocentral setae ; clad with narrow, white, yellowish and brown scales, but not in a regular pattern ; scutellar lobes with elongate white scales ; anterior pronotal lobes with broad white scales, posterior lobes with broad scales on lower half and narrower scales anterodorsally ; pleurae with patches of broad white scales, and on upper mesepimeron a small patch of narrow white scales adjoining a tuft of pale setae.

Legs : coxae with broad white scales ; femora dark with scattered white scales giving a speckled appearance ; tibiae speckled with an apical ring of white scales ; fore tarsus with narrow basal white rings on I and II, segment IV much smaller than either III or V ; mid-tarsus with clear basal white bands on I, II and III, and a variable amount of white scaling on IV and V ; hind tarsus with a narrow basal band on I, clear basal (0·12 of the segment) and apical (0·16) bands on II ; III white except for a central dark band occupying 0·33–0·50 of the segment, IV and V all white (fig. 1*a*) ; fore and mid-tarsal claws unequal, the larger claw toothed ; hind tarsal claws equal and simple.

Wings : costa marked with 8 areas of pale scaling as is general in the group : basal, prehumeral, humeral, presectoral, sectoral, subcostal, preapical, and apical ; the pale

scaling on other veins essentially the same as in other members of the groups, minor variation present among the series examined ; extent of prehumeral area variable, and humeral and presectoral areas may be partially joined.

Abdomen : tergites dark with variable pale markings : I with a narrow lateral band of broad white scales and a central, roughly ovoid patch of flat dark scales on apical margin ;

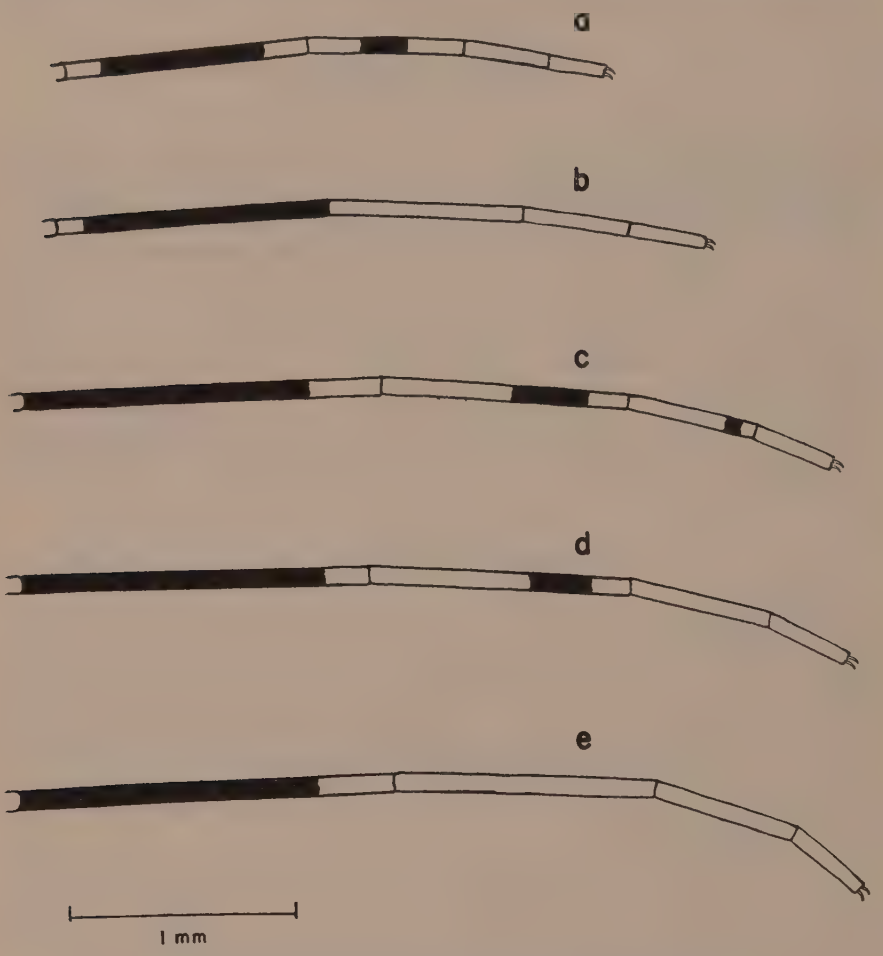


Fig. 1.—Segments II–V of hind tarsus of : (a) *wilsoni*, (b) *albipes*, (c) *anopheloides*, (d) *maculipes*, (e) *andamanensis*.

remainder of tergite bare of scales but with a large number of long setae ; tergites II–VII with basolateral and apicolateral white or yellowish spots ; in addition, II has a large central area covered with yellow scales, and III–VII have basal yellow bands and a pair of submedian yellow spots ; basal bands and paired spots may be reduced or even absent, and similarly, area of yellow scaling on II may be reduced ; sternite II largely covered with pale scales, the remaining sternites dark, usually with narrow basal pale bands.

Terminalia : basal lobe of basistyle with 4 prominent elongate spines as in other members

of the group; prolongation on eighth tergite similar to that of *albipes*, i.e. the caudal margin straight or slightly convex with a crenated edge.

ADULT FEMALE

Differs from male as follows: proboscis without a narrow median ring but with extensive apical pale markings; typically there is a broad pale ring with a ventral extension distally, and a pale patch dorsally between the ring and the pale labella; palpus nearly half length of proboscis, with a few pale scales at the base, and pale scales apically on each of the 2 terminal segments; antenna with elongate pale scales only on first flagellar segment; tarsal claws simple and equal; thoracic, wing, and abdominal markings much as in the male.

LARVA

Head: antenna 6·5–8·5 times as long as greatest width; as in *albipes*, the base not so swollen as is usually the case in *maculipes* and *andamanensis* which results in a rather higher ratio of length to width; antennal hair inserted at 0·29–0·41 length of antenna from base (*see* Table).

Table showing larval differences between Malayan species of Orthopodomyia*

Species	Number of Specimens	Antennal ratio	Insertion of antennal hair from base	Siphon ratio	Insertion of siphonal hair from base	Siphon/anal plate ratio	Combined siphonal hair branches
wilsoni . .	13	6·5–8·5	0·29–0·41	5·5–10·0	0·26–0·34	3·9–5·9	13–17
		7·6	*0·35*	**8·2**	*0·29*	**5·1**	**15** (5)
albipes . .	12	6·4–8·8	0·29–0·40	3·9–5·2	0·29–0·34	2·9–3·8	18–27
		7·5	*0·34*	*4·4*	*0·31*	*3·2*	*21* (14)
maculipes .	16	5·0–6·7	0·24–0·33	2·8–3·8	0·41–0·45	2·2–2·6	21–25
		5·6	*0·27*	*3·3*	*0·43*	*2·4*	*23* (15)
andamanensis	11	5·2–6·8	0·21–0·27	3·6–5·0	0·37–0·41	2·5–3·2	22–26
		5·7	*0·25*	*4·4*	*0·39*	*2·9*	*24* (9)

Means are in italic figures and those distinctive of *wilsoni* are in bold type.
Number of specimens examined as given in column 2 unless shown otherwise in brackets.
* The single available specimen of *anopheloides* is not distinguishable from *maculipes*.

Abdomen: sclerotised plate on segment VIII incomplete ventrally, band on anal segment incomplete dorsally but may be complete or incomplete ventrally; siphon index 5·5–10·0; siphonal hair usually much less prominent than in *albipes*, *maculipes* and *andamanensis*, with fewer branches, and situated 0·26–0·34 times length of siphon from base (fig. 2*a*); siphon 3·9–5·9 times length of anal plate, which is a higher index than in other species examined (*see* Table); large comb teeth with a central stout spine and a fine subbasal fringe as in *albipes*; lateral hair with 3–4 branches.

PUPA

Trumpet long and cylindrical, 4·5–5·7 times as long as broad (fig. 2*a*), dark brown in colour except at base and apex; paddle bluntly pointed, the terminal seta very small.

Diagnosis. The adult is readily identified by the pale basal and apical banding on both segments II and III of the hind tarsi (fig. 1*a*), the larva by the long, narrow siphon (fig. 2*a*), and the pupa by the shape of the trumpet (fig. 2*a*).

Holotype ♂ and allotype ♀, MALAYA: Selangor, Ulu Gombak Forest Reserve.

Holotype and allotype, with two paratypes of each sex, all with associated larval and pupal skins, to be placed in the British Museum (Natural History). Two paratypes of each sex with associated larval and pupal skins will be placed in the United States National Museum.

The species is named in honour of Dr. T. Wilson, Director of the Institute for Medical Research, Kuala Lumpur, who has encouraged and participated in the study of Malayan mosquitoes for many years.

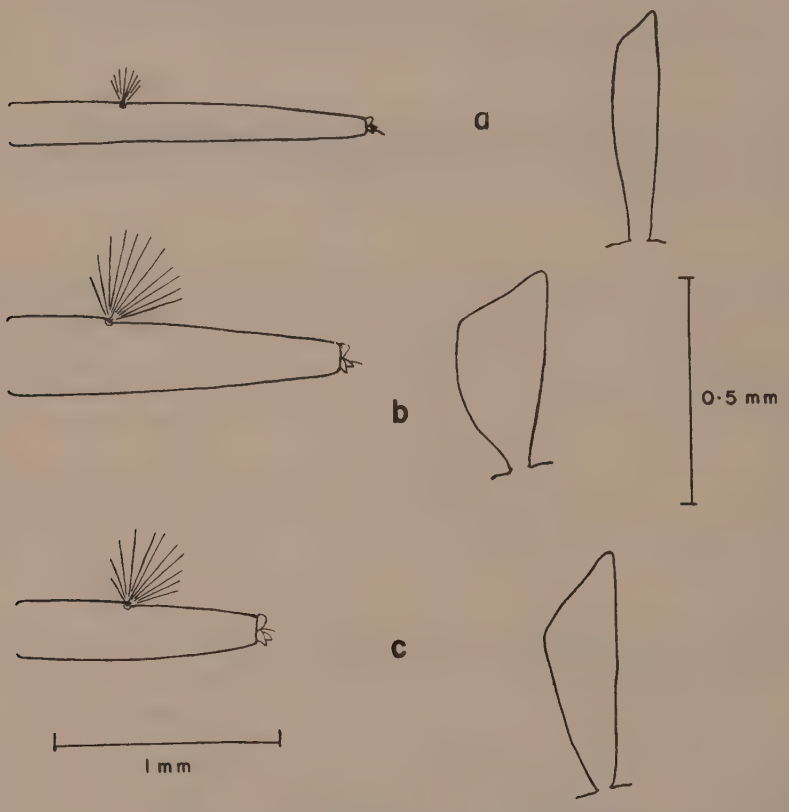


Fig. 2.—Larval siphon and pupal trumpet of: (a) *wilsoni*, (b) *albipes*, (c) *maculipes*. The trumpets are drawn to a scale twice that of the siphons.

Notes on the Biology of the Malayan Species

Very little is known about the habits of the adult *Orthopodomyia*, for only rarely has an adult been captured biting man. This is true not only of Malaya but of elsewhere. All that can be said for the time being is that in Ulu Gombak *albipes* has been taken attacking man on only seven occasions, once or twice being allowed to take a blood meal, but none of the other species has yet been caught, although numerous mosquito catches have been made at all hours of the day as well as during the hour before sunrise and the two hours after sunset. Occasional specimens of *albipes* have also been collected by sweep-netting the undergrowth.

In contrast to the adults, larvae can be collected fairly easily, with the exception of *anopheloides*, and the species fall into two groups according to their breeding preferences. In the first group are *albipes* and *wilsoni* which are found in bamboos, in the second are *maculipes*, *andamanensis* and *anopheloides*, which are primarily tree-hole breeders.

O. albipes is the most common species at Ulu Gombak and, because the general term " bamboos " might be misleading, it is necessary to define the breeding places a little more precisely. At present, four types of breeding place in bamboos are recognised :

(1) *Bamboo stumps.* Thirty-five collections of mosquito larvae have been made from bamboo stumps but only in two were *albipes* larvae found ; this is not therefore a very favoured habitat of *albipes*, or of *wilsoni*.

(2) *Split and fallen bamboo.* Under this heading are included the bamboos with large cracks through which mosquitoes could easily fly into the internodes where water collects. Usually the bamboos have fallen flat or are supported at an angle by adjoining bamboos and trees. In 37 collections of larvae, *albipes* occurred six times and *wilsoni* once, so that this is a moderately favoured breeding site.

(3) *Bamboos with holes and cracks of moderate size.* In this case the opening into the internode of the bamboo might be quite small, perhaps about 1 cm. in diameter, but it is large enough for a gravid female to pass through without difficulty. The bamboos may be upright and living, or fallen and dead. This seems to be the preferred breeding place of *albipes*, for in 23 collections this species occurred 12 times, whilst, in addition, two of the three collections of *wilsoni* are also from here.

(4) *Bamboos with very small holes.* In this group the holes are as small as 2 mm. by 1 mm. (made by beetles as far as is known), in other words smaller than most mosquitoes. So far only about a dozen collections of mosquito larvae have been made from these situations, and no *Orthopodomyia* have as yet been found in them. It is quite likely that the size of the hole or crack leading into the internode of the bamboo is the factor determining whether or not *albipes* and *wilsoni* will utilise the breeding site.

Of the tree-hole breeders, *maculipes* has been most common (in nine of 48 collections) whilst *anopheloides* has been collected only twice ; *andamanensis* has occurred five times with *maculipes*, once with *anopheloides*, and once it was taken from a bamboo stump. In the latter case it seems likely that the conditions in the stump approached those of tree-holes, for with *andamanensis* was a species of *Aëdes* subgenus *Finlaya* which is typically a tree-hole breeder.

This separation of the Malayan species into two groups on the basis of the breeding habits is supported also by the physical characteristics of the species. Although the group as a whole is very homogeneous, *albipes* and *wilsoni* are probably most closely related, resembling each other in the shape of the eighth tergite and in several larval features, particularly the comb teeth and antennae. On the other hand, *maculipes*, *anopheloides* and *andamanensis* also resemble one another in many ways, especially in larval characters. No further light can be thrown, however, on the relationship between *maculipes* and *anopheloides*, since *anopheloides* is apparently rare in Ulu Gombak. As Knight and Mattingly (1950) point out, those two species differ in only one character—the dark band on hind tarsus IV. In one of the only two specimens of *anopheloides*

available to me this band is incomplete and is represented by only about half a dozen dark scales. It may well be therefore that *maculipes* does not deserve specific rank. Perhaps future collections will help to resolve this question.

Reference

Knight, K. L. and Mattingly, P. F., 1950, The *Orthopodomyia anopheloides* subgroup of mosquitoes (Diptera, Culicidae). *Proc. ent. Soc. Wash.* **52** : 1–20.

Book Notice

A Laboratory Manual for Insect Morphology. By E. H. Strickland, B. Hocking and G. E. Ball. 8vo. New York (Scholar's Library), 1958. Pp. 81, text illust.

This manual has grown out of the instructions and outlines given to students of the Entomology Department in the University of Alberta, over the course of 15 years.

The work is divided into nine parts, each dealing with a different section of the insect body and with its digestive, respiratory, reproductive and nervous systems. There is a preliminary section on the origin of insects.

Illustrations are kept to a minimum as it is intended that students should make their own diagrams direct from specimens in preference to copying other drawings.

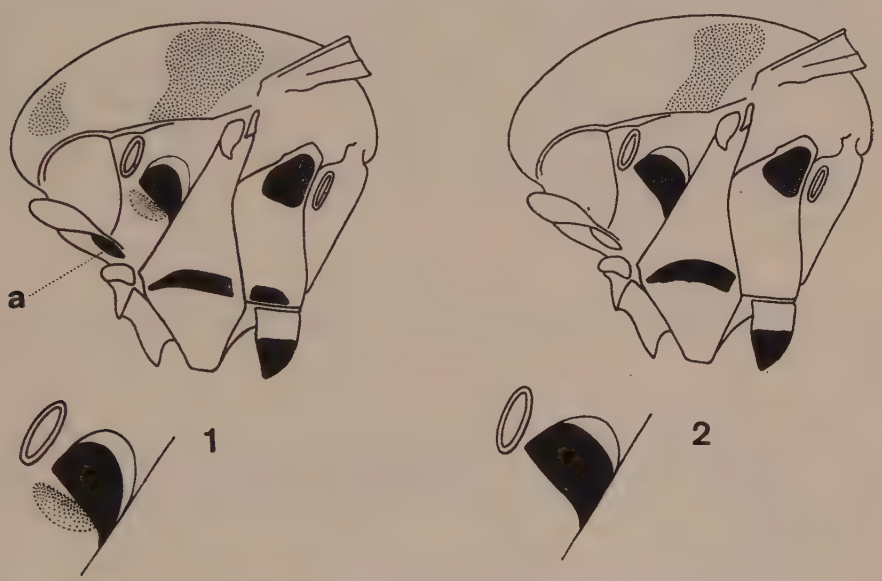
A bibliography of text-books and works of reference to be used in conjunction with the instructions is included.

IDENTIFICATION OF ADULT *MANSONIA* (*COQUILLETTIDIA*) *PSEUDOCONOPAS* THEOBALD AND *M.* (*C.*) *MACULIPENNIS* THEOBALD (DIPTERA : CULICIDAE)

By Philip S. Corbet

(*East African Virus Research Institute, Entebbe, Uganda*)

The closely related African mosquitoes, *M.* (*C.*) *pseudoconopas* and *M.* (*C.*) *maculipennis* can be distinguished readily as larvae, pupae and adult males (Edwards, 1941 ; Gillett, 1945, 1946, 1949). As adult females, however, the two species have hitherto been differentiated only on scutal characters, which are subject to considerable variation and wear. Thus the anterior half of the scutum in *pseudoconopas* bears two dark patches of scales (Edwards, 1941), whereas in *maculipennis* it is immaculate and has a distinctly burnished appear-



Figs. 1–2.—(1) *M.* (*C.*) *pseudoconopas.* (2) *M.* (*C.*) *maculipennis. Above :* lateral view of adult thorax, from left side ; *a*, sulcus between anterior and posterior pronotal lobes. *Below :* enlargement of spiracular area.

ance (Haddow, van Someren, Lumsden, Harper and Gillett, 1951) ; but these characters may be obscured completely in worn specimens.

Recently I have examined a large number of adults of both species caught in the Mengo district of Uganda, and have found in *pseudoconopas* an additional character which enables adults to be distinguished from *maculipennis*, irrespective of their sex or degree of scutal wear. This character is not only constant in males but also in females identified as *pseudoconopas* on the scutal patches mentioned above.

In both species the postspiracular area (on the thoracic pleura) is dark brown, but in *pseudoconopas* there is on the subspiracular area a dark spot, adjoining the postspiracular area and lying anterior to it (*see* figs. 1 and 2). This subspiracular dark spot has not been present in any specimen of *maculipennis* I have examined.

To test the reliability of this character for identification, males and females of the two species (86 specimens in all) were first identified on genitalia (males) and scutal patches (females) and then mutilated in such a way that a second identification had to be based entirely on thoracic pleural markings. With a $\times 9$ lens, and at higher magnifications, all specimens were identified correctly and without hesitation. When a $\times 6$ lens was used, one *maculipennis* was wrongly assigned. It must be emphasised that the reliability of this character has so far been confirmed only in the Mengo district, Uganda, though there is no reason to suppose that it is not reliable elsewhere.

Two other characters, shown in figures 1 and 2, can be used to assist identification, though neither is incisive. (1) The black mark near the lower edge of the mesepimeron, stated by Edwards (1941) to be absent or indistinct in *maculipennis*, is developed strongly in *pseudoconopas* as a continuation of the sternopleural dark band. It thus represents a difference in nearly all specimens, although in a few *maculipennis* it may be indicated slightly at the anterior end of the mesepimeron. (2) The sulcus between the anterior pronotal lobes and the posterior pronotal area is dark brown in *pseudoconopas* (fig. 1, *a*) but uncoloured in *maculipennis*. Sometimes this difference may be difficult to discern on account of the sulcus being in shadow.

Acknowledgments

I wish to thank Dr. J. D. Gillett for having collaborated in the identification test.

Summary

A subspiracular dark spot, present in *M.* (*C.*) *pseudoconopas*, but absent from *M.* (*C.*) *maculipennis*, can be used reliably to distinguish the two species at a magnification of $\times 9$ or greater. This and other characters are described and figured.

References

Edwards, F. W., 1941, *Mosquitoes of the Ethiopian Region*, **3**. *Culicine adults and pupae*. London. Brit. Mus. (Nat. Hist.).

Gillett, J. D., 1945, The larvae and pupae of *Taeniorhynchus* (*Coquillettidia*) *maculipennis* Theobald. *Bull. ent. Res.* **35** : 395–7.

—— 1946, Notes on the subgenus *Coquillettidia* Dyar (Diptera, Culicidae). *Ibid.* **36** : 425–38.

—— 1949, Further notes on the Ethiopian species of *Taeniorhynchus* Arribalzaga (Diptera : Culicidae). *Proc. R. ent. Soc. Lond.* (B) **18** : 97–102.

Haddow, A. J., van Someren, E. C. C., Lumsden, W. H. R., Harper, J. O. and Gillett, J. D., 1951, The mosquitoes of Bwamba County, Uganda. VIII.—Records of occurrence, behaviour and habitat. *Bull. ent. Res.* **42** : 207–38.

NEW NEMESTRINIDS (DIPTERA) FROM SOUTH AFRICA

By Frank M. Hull

(*University of Mississippi*)

[Communicated by Mr. H. Oldroyd]

Prosoeca oldroydi sp. n.

This species traces to *Prosoeca fusca* Loew in the key given by Bezzi (1924, *Ann. S. Afr. Mus.* **19** : 174). It is distinguished by the distinct, medial band of dark, reddish sepia triangles fused together on the middle of the abdomen and a similar spot laterally.

Length 12–15 mm.

Male.—Head : reddish-brown with sparse, brownish to greyish-yellow pollen on the front, becoming more reddish-brown on vertex ; pollen on face pale yellow and its pile brownish-yellow and shorter than pile of front and vertex, which is dark red-brown ; cheeks with dense, pale, brownish-yellow, long, tufted pile ; first 2 segments of antenna and extreme base of third segment brownish-yellow with light red pile ; third segment and the three-segmented style black ; ocellar triangle occupies whole of vertex, posterior part swollen with posterior ocelli lying adjacent to the eye ; anterior ocellus with a deep crease transversely in front ; the front in contrast to some species densely covered with long, erect pile, as is the whole ocellar triangle ; proboscis light cinnamon brown anteriorly and below at base ; black narrowly and laterally along the middle and also whole apex ; proboscis extends to middle of abdominal sternum ; palpus pale orange-brown, the second segment with a dark apex and an apical pore, and both segments with brownish-yellow pile below ; no hairs at apex.

Thorax : opaque blackish in ground colour but densely covered with dark, ochre brown pollen, lighter along the lateral margins, where it is pinkish-brown on the notopleuron, greyish behind the suture ; suture and a tiny medial spot at end of suture opaque-grey ; pleuron lighter in colour but blackish above the middle coxa, the whole densely covered with greyish to yellowish-white pollen and dense, long, yellowish-white pile that changes to red on anterior basalare ; all pile of mesonotum and opaque, reddish-brown scutellum reddish-brown in colour ; squamal fringe similar.

Legs : pale brownish-orange, bases of all femora more yellowish, hind tibia and basal tarsal segments darker red-brown, last tarsal segment nearly black ; pile of middle tibia and anterior tibia minute, flat appressed and reddish-golden ; a little of pile on hind femur and hind tibia similar in colour and character but most of it dark, reddish-brown ; all femora with chiefly long, erect, yellowish-white pile, which may become brownish towards apices and forms posteroventral fringes ; claws black with base reddish, sharp and unusually strongly curved.

Wings : venation typical ; no petiole at base of fourth posterior cell ; costal cell, subcostal cell and extreme base of wing pale, yellowish-brown ; alula well developed, attenuate basally ; remainder of wing brownish-hyaline, diffusely darker towards base of first 2 basal cells.

Abdomen : broad, obtuse, brownish-black in ground colour, densely reddish-chocolate brown pollinose down the middle, where colour is distributed as posterior, basally fused triangles or hour-glass shaped spots ; first segment also dark ; a large, lateral reddish-sepia spot on sides of second tergite, a smaller one laterally on third, a still smaller one at base laterally on fourth tergite ; terminalia reddish-sepia with light brown pollen ; pile of abdomen dense, erect, long and reddish-brown with considerable, flat appressed, reddish-

golden pile also, and with base laterally on second tergite bearing erect, yellowish pile, not very conspicuous.

Holotype ♂, AFRICA : Durban ; 2 ♂ paratypes, same data. The type and one paratype in the collection of the British Museum (Natural History) ; one paratype in the author's collection.

Prosoeca pygmea sp. n.

An extremely small species, not more than 6 mm. in length and only half the length of *Prosoeca connexa* Bezzi, which in itself is a small species in this genus, it is readily separated from *P. connexa* by the absence of black pile on the sides of the face, the presence of the ocellar tuft of orange pile and the absence of spots on the wings.

Length 6 mm. ; length of wing 6·5 mm.

Male.—Head : protuberant, ocellar triangle black and moderately shining with very faint, dark brown dust ; ocellar triangle occupies the whole vertex and is margined by a transverse, anterior crease and covered with dense, long, brownish-orange pile ; front black and densely covered with grey white pollen and dense, quite long, fine, erect, white pile ; eyes separated at narrowest point by a distance equal to a little more than length of first 2 segments of antenna ; front convex, separated from convex and more protuberant face by a curving, depressed crease ; face very dark, reddish-brown, somewhat shining, thinly dusted with pollen, which is more dense laterally and covered by loose, fine, long, white pile ; palpus brownish-yellow with a black tip and white hairs ; first 2 segments of antenna brownish-yellow, third segment and the four-segmented style black ; proboscis pale brown in front, darker behind, the apex and a narrow, lateral stripe black ; it extends to middle of abdominal sternum.

Thorax : dull, brownish-black with an obscure pair of widely separated, pale, yellowish-brown, narrow vittae, widened at anterior margin ; transverse suture not delineated ; ground of entire thorax and scutellum black, latter with very dark, brown pollen and dense, long, fine, erect, pale brown pile ; most of mesonotal pile similar in character, colour and density, but becoming greyish-white in region of humerus and on extreme anterior border beneath postcallus ; pale yellow above postcallus ; pleuron black, wholly grey pollinose with dense, brownish-white pile becoming completely white on front coxa and meta-pleuron ; pile on anterior part of thorax merges with dense, bushy, white pile beneath occiput and cheeks.

Legs : pale brownish-yellow, the femora somewhat lighter, the last tarsal segment on all legs blackish ; pile of all tibiae consists of stiff, black, rather small, oblique setae ; femora with some similar pile, especially on hind pair, which also bear some subappressed, yellow pile ; first 4 femora with minute, black setae towards apex, dorsally and anteriorly, and also long, posterior fringes of white pile ; setae of hind tibia much longer and stouter dorsally and laterally and quite numerous.

Wings : venation typical, fourth posterior cell lacks petiole, alula rather wide apically, costa and next 2 veins pale yellow, the others light brown ; first vein straight but next 3 veins distinctly turned up at apex ; whole wing hyaline.

Abdomen : quite obtuse and broad, much wider than thorax ; in ground colour brownish-black but densely ochre-brown pollinose ; sides of second, third and fourth tergites widely but obscurely and diffusely yellowish-brown ; abdominal pile long, fine, erect and moderately dense, white on first segment and base of second, light brownish-orange on most of second and all of third and white beyond ; in addition, slightly on posterior part of second segment, more conspicuous yet scanty on middle of third segment, some flat appressed, yellow and partly white pile present which forms submedial patches ; on each side of

middle of fourth segment a more dense mat of flat, appressed, white pile; terminalia brownish-yellow with white pollen and pile.

Holotype ♂, South Africa: Mitchell's Pass, 100 miles from Cape Town, 1–5.xii.1930 (*H. W. Simmonds*). Type in the British Museum (Natural History).

Acknowledgment

I should like to thank Mr. H. Oldroyd for the privilege of studying this material from the British Museum (Natural History) collections.

Book Notice

University of California Publications in Entomology. Vol. 14, No. 1. A synopsis of Hymenopterous parasites of *Malacosoma* in California (Lepidoptera, Lasiocampidae). By R. L. Langston. 8vo. Berkeley and Los Angeles (University of California Press), 1957. Pp. 50, tabs. $1.00.

After outlining the procedure adopted in the survey on which this paper is based the author gives a synopsis of the host insects, including their distribution, description, food plants and the known and newly discovered parasites pertinent to California.

The hymenopterous parasites are then dealt with in detail in three groups, larval and pupal parasites, egg parasites and hyperparasites. Under each parasite the range and hosts are listed, with notes of hosts other than *Malacosoma* species to indicate whether the species is parasitic on a wide variety of hosts or is restricted to Lasiocampidae and their near allies.

References to previous work on the particular species of parasite as it concerns *Malacosoma* are given followed by the data from the present series of studies.

Book Notice

Annual Review of Entomology. Edited by E. A. Steinhaus. Vol. 3. 8vo. Palo Alto, California (Annual Reviews Inc.), 1958. Pp. vii, 520, text illust. $7.00.

The third volume of this *Review* contains 23 papers dealing with the following subjects :

The nervous system, K. D. Roeder.
Chemoreception in arthropods, E. S. Hodgson.
Internal symbiosis in insects, A. G. Richards and M. A. Brooks.
Nutritional requirements of phytophagous insects, W. G. Friend.
Recent advances in silkworm nutrition, J. M. Legay.
Uses of sounds by insects, H. Frings and M. Frings.
Dynamics of insect populations, A. J. Nicholson.
Ovarian structure and vitellogenesis in insects, P. F. Bonhag.
Genetics and breeding of the Honey bee, W. C. Rothenbuhler.
The phylogeny of the Panorpoid orders, H. E. Hinton.
Zoogeography of insects, J. L. Gressitt.
Hybridization and speciation in mosquitoes, L. E. Rozeboom.
The feeding habits of biting flies and their significance in classification, J. A. Downes.
Resistance of plants to insects, R. H. Painter.
Biological control of insect pests, C. P. Clausen.
Biology of Scarabaeidae, P. O. Ritcher.
Insect eradication programs, W. L. Popham and D. G. Hall.
The chemistry and action of acaricides, R. B. March.
Organic phosphorus insecticides for control of field crop insects, W. A. L. David.
Insecticides for control of adult Diptera, R. W. Fay and J. W. Kilpatrick.
Forage insects and their control, G. G. Gyrisco.
Control of forest insects, R. E. Balch.
Transmission of plant viruses by arthropods, K. M. Smith.

The pattern of the previous two volumes is continued, each article being followed by a list of references to the literature cited, with an author and subject index at the end of the volume.

ON THE EXAMINATION OF SOME MEIGEN AND ZETTERSTEDT SPECIMENS OF *CAMPICHAETA* MACQUART (DIPTERA : DIASTATIDAE)

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AND

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In connection with a study of old collections of Drosophilidae, especially concerning the identity of Fallén's specimen of *Drosophila tristis* Fln. (Basden, in press, *Ent. mon. Mag.*), it was considered necessary to examine original specimens of some species now placed in the genus *Campichaeta* Mcq., previously known as *Thryptochaeta* Rnd. (Diastatidae). Through the kind co-operation of the authorities of the Natural History Museums at Vienna, Lund and Stockholm this has been possible and an attempt at finality on the question of names by which they should be known is made here. Our best thanks are due to Dr. M. Beier of Vienna, Prof. C. H. Lindroth and Dr. P. Ardö of Lund, and Dr. R. Malaise of Stockholm for the trouble they have taken. A full list of the specimens we have been privileged to examine is given in the table at the end of this paper.

The Generic Name

Macquart's generic name of *Campichaeta* (1835 : 547, originally spelt *Campichœta*) was placed as a queried synonym of *Thryptochaeta* Rnd. (1856 : 134, originally spelt *Thryptocheta*) in Becker's *Katalog* (1905 : 227), and Duda in 1934 accepted the synonymy as correct. There is nothing in Macquart's description which can be considered contradictory to this synonymy, and the single originally included species, *rufipes* Mcq., the type of *Campichaeta*, is a synonym of the older *Diastata obscuripennis* Mg., which thus becomes the type of the genus, while *Diastata punctum* Mg., by original designation, remains the type of *Thryptochaeta*.

Notes on the Specimens Examined

Geomyza griseola Zett., 1855, *Dipt. Scand.* **12** : 4799 ♂; and 1860, *Op. cit.* **14** : 6423 ♂.

The two original male specimens (the syntypes) sent to Zetterstedt by Boheman are present in Zetterstedt's Insecta Lapponica Collection, and we have seen specimens of the same species (11 ♂, 8 ♀) from Boheman's Collection at Stockholm. The above are *not* the same as *C. punctum*, but a closely allied species with obviously distinct male genitalia (figs. 1, 2). One of the males in Zetterstedt's Collection (Ztt " 82 " of our notes) has been selected and labelled as Lectotype.

The two males of *griseola* mentioned by Zetterstedt in 1860 as captured by Roth at Lund are also present in the Collections there (one in the Ins. Lapp. Coll., and one in Roth's Coll.), but they are not the same as those taken by Boheman, and are males of *punctum* Mg.

Fig. 1.—*Campichaeta griseola* (Ztt.). Genitalia of Lectotype (Ztt "82"). (For explanation of lettering see page 144.)

A third specimen captured by Roth was evidently sent by him to Boheman, and is present in the latter's collection under the name *Geomyza griseola* Zett., labelled "Sc" and "Roth". It is much damaged, having lost the arista of

its antennae and its abdomen, but is probably a female. This also is *punctum* Mg., and not true *griseola*. It was also the only specimen of the supposed *G. griseola* Zett. from Boheman's Collection seen by Czerny (1903, *Wien. ent. Ztg.* **22** : 125), and accepted as typical, causing him to sink incorrectly the name of *griseola* Zett. as a synonym of *punctum* Mg.

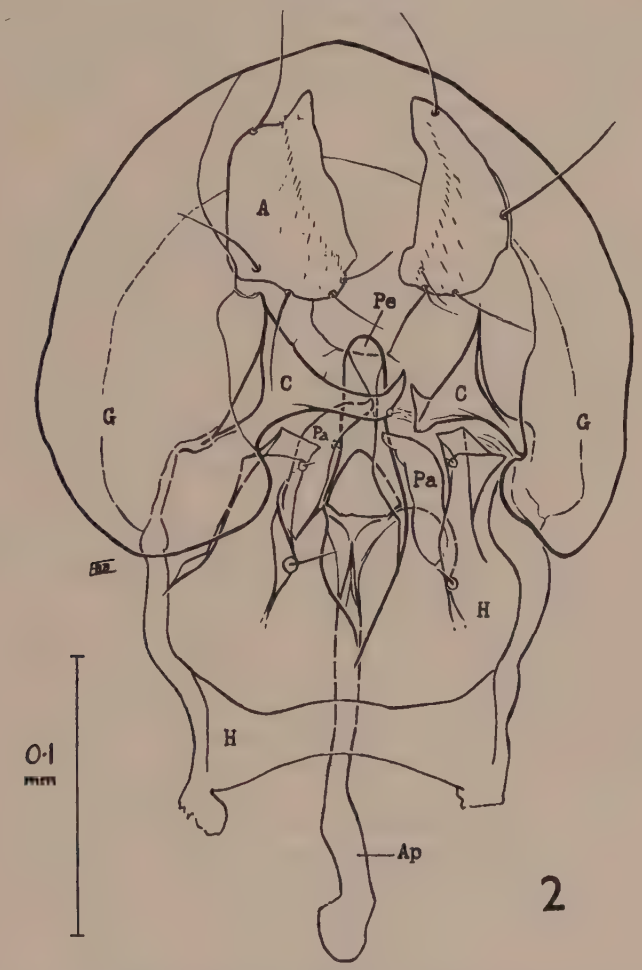


FIG. 2.—*C. griseola* (Ztt.). Genitalia of specimen Boh B. Hairs and bristles on genital arch and anal plates mostly omitted.

Diastata punctum Mg., 1830, *Syst. Beschr.* **6** : 98, No. 10.

The type of *punctum* is evidently in Meigen's Collection at Paris, and has not been seen by us, but was reported by Becker in 1902 (*Zt. syst. Hymen. Dipt.* **2** : 305) as being without head, and with thorax having only one wing and two legs, but was considered by him to be the same as the *D. basalis* in the Winthem Coll. The condition and identity of the specimen has kindly been confirmed by

Prof. E. Séguy (*in litt.* 19.iii.58), who also states that it is a male. The identification is accepted by us as correct, and as the two specimens of *punctum* in the Winthem Collection agree with the specimens of *basalis* in that Collection, they apparently therefore also agree with the type of *punctum* in Meigen's Collection. Our reasons for following Becker (1905 : 227) in the use of the name *punctum* for this species will be found below.

In Zetterstedt's Collections there are three specimens (1 ♂, 2 ♀) of *punctum*, so named from Staeger, and a female with a locality label " Sjórup ", and there is also the female from Trawemünde apparently taken by Dahlbom.

Diastata basalis Mg., *loc. cit.*, No. 9.

Meigen described this species from *two* specimens in the Winthem Collection, but Becker reported *three* specimens, which latter are still in that Collection, each bearing a modern red " Type " label. This definitely raises doubts whether any specimen bearing such a label can always be accepted as being one actually described by Meigen. In the same Collection under *basalis* there are additional specimens, all being the species usually known as *punctum*. They all (except when obviously discoloured) have the genital segments yellow in both sexes, as described by Meigen for *punctum* but not so described by him for *basalis*. This latter description was otherwise misleading, because in all the supposed type specimens as well as in all the others the frons and thorax are not " braünlichgrau ", the front of frons being distinctly yellowish, while the thorax has indications of the darker stripes mentioned in Meigen's description of *punctum* ; moreover the scutellum is not " hellgelb " (though the border may be). As a consequence Meigen's *basalis* remained completely unrecognised until Becker in 1902 had examined these so-called types, while Meigen's *punctum* became easily recognised from his description. This is of considerable importance because both species were described on the same page, the name *basalis* coming first, and under the Rules of Nomenclature, " other things being equal ", would have precedence over *punctum*. Becker who was the first to call attention to the synonymy of the two species, as indicated by the specimens of *basalis* in the Winthem Collection and by the type of *punctum* in Meigen's Collection, evidently considered that " other things " were very far from " equal ", and exercised the option allowed by the Rules, by continuing (1905, *Katalog*) the use of the universally accepted name of *punctum* for the species, and we propose to follow him in doing the same. Under these circumstances we have not selected and labelled a lectotype for *basalis*.

Opomyza circumdata Mg., *op. cit.* **6** : 103.

The specimen of *Opomyza circumdata* in the Winthem Collection is a female of *punctum* Mg. and from the small pink label can safely be taken to have been in Meigen's hands. According to Becker the typical specimen (sex not stated) standing under this name in Meigen's Collection at Paris is also *punctum*. (Séguy, *in litt.* 19.iii.58, says the Meigen Collection does not now contain *O. circumdata*.) This synonymy has usually been accepted, though it should be noted that Meigen's description of the scutellum of *circumdata* as " halb kreisrund ", and of the wings as having " die kleine Querader wie gewöhnlich auf der Mitte " are incorrect for a specimen of *punctum* or even of *Campichaeta*.

The next three species were described by Meigen from specimens from the Winthem Collection, and all are *C. obscuripennis*, the species described in 1864 by Loew as *Thryptochaeta nigricornis*.

Diastata obscuripennis Mg., 1830, *Op. cit.* **6** : 97, No. 5.

There has been some doubt as to whether *obscuripennis* Mg. was the same as *nigricornis* Lw. owing to Meigen's description of the arista as " kürzgefiedert " (as used for instance by him in describing the arista of *Diastata costata*). However in species of *Campichaeta* the arista of females is nearly always rather longer haired than in males, and two out of three Vienna types of *obscuripennis* are females. The male (Winth 187) has been labelled as Lectotype. Becker (1902, *op. cit.*) mentions a female at Paris and three specimens at Vienna.

Diastata fumipennis Mg., *loc. cit.*, No. 6.

One of the females (Winth 185) in the Winthem Collection that appears to answer better to Meigen's description in having a discoloured patch on thorax and left pleura, owing to an exudation of fluid from the aperture made by pinning, has been selected and labelled as Lectotype. Another one bearing a locality label " Lübeck Aug. 35 " is obviously incorrectly labelled as " Type " because it was captured subsequent to the appearance of the description and therefore was not one of the syntypic series. Becker (1902) mentions only one specimen, a female, at Paris, it being the same as *obscuripennis*.

Diastata luctuosa Mg., *loc. cit.*, No. 7.

Meigen described the femora of *luctuosa* as " nigricantibus ", and though in mature specimens of *obscuripennis* at least the hind femora are somewhat darkened except at base and tip, they may often be entirely pale and indeed are not now darkened in the two specimens of *luctuosa* in the Winthem Collection. Becker in 1902 appears to have seen only one of the two specimens in the Winthem Collection, a male without antennae, and did not recognise that it was (as both specimens certainly are) the same species as that described by Meigen as *obscuripennis*. The more complete specimen (Winth 184, with head) has now been selected and labelled as Lectotype. The specimen of *luctuosa* at Paris was found by Haliday and Becker to be an Ephydrid.

The species we have considered of the genus *Campichaeta*, and their synonymy, would therefore appear to be as follows :

1. *C. griseola* (Zett.) (1855 *nec* 1860), (*Geomyza*).
2. *C. punctum* (Mg.) (1830), (*Diastata*).
   basalis (Mg.) (1830), (*Diastata*).
   circumdata (Mg.) (1830), (*Opomyza*).
   griseola (Zett.) (1860 *nec* 1855), (*Geomyza*).
3. *C. obscuripennis* (Mg.) (1830), (*Diastata*).
   fumipennis (Mg.) (1830), (*Diastata*).
   luctuosa (Mg.) (1830), (*Diastata*).
   rufipes (Mcq.) (1835), (*Campichaeta*).
   nigricornis (Lw.) (1864), (*Thryptochaeta*).

The chief characteristics of the three species are discussed below.

Campichaeta punctum (Mg.)

Front of frons and antennae at base usually yellowish. Thorax greyish with 4 brownish-grey stripes. Abdomen usually pale about base and with genital and sixth and seventh segments whitish. Genitalia (figs. 3, 4) with distinct claspers. In male sixth tergite bare and usually hidden below fifth (in female slightly hairy and more evident), and seventh with 6–8 marginal hairs (not spines) that are definitely weaker than marginal hairs on fifth segment. Legs yellow. Wings especially darkened along costal margin, less so on

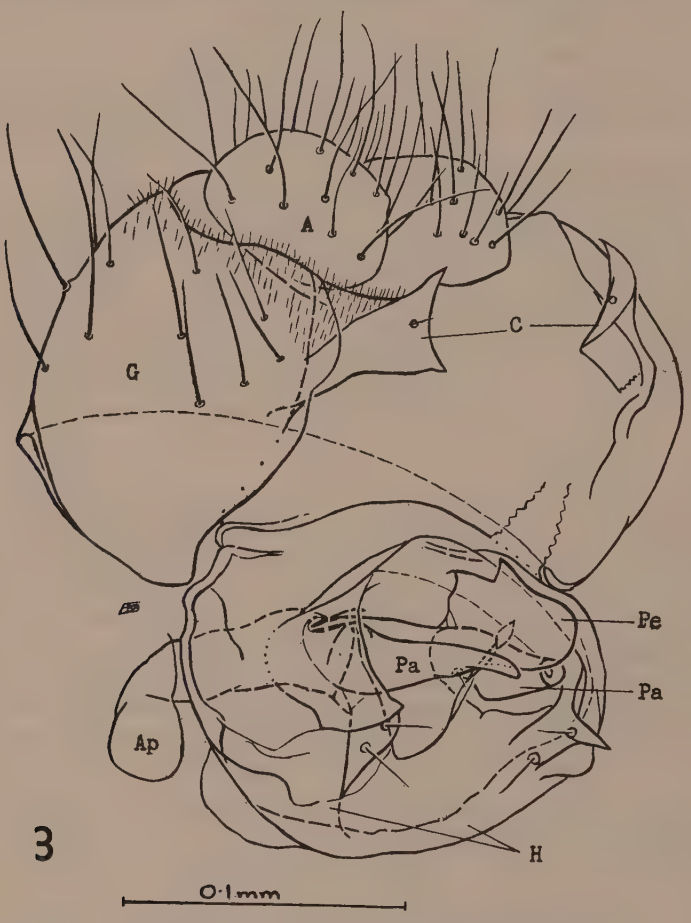


Fig. 3.—*C. punctum* (Mg.). Genitalia of specimen Winth 189. The genital arch is slightly damaged.

lower half of wing and beyond outer cross-vein, where the pale fleck mentioned by Meigen can clearly be seen with the naked eye; costa practically without small spines in male, but more present among lower row in female.

It is a widely distributed autumn and early spring species, sometimes found on windows.

Campichaeta griseola (Zett.)

Closely resembles, and consequently easily confused with, *punctum*; wings, however, less darkened about costal margin, and consequently more uniformly, and more faintly, darkened; costa *in both sexes* with small, spaced spines among hairs of lower row of second section, sometimes for two-thirds its length. Aristal hairs rather longer, even in male. Male genitalia obviously distinct, especially in the shape of claspers or paralobes (figs. 1, 2). Size about the same as other species. All specimens examined have been old and perhaps faded; in freshly caught specimens other distinctions from *punctum* will probably become available.

The only specimens known at present are those taken by Boheman in Central Sweden.

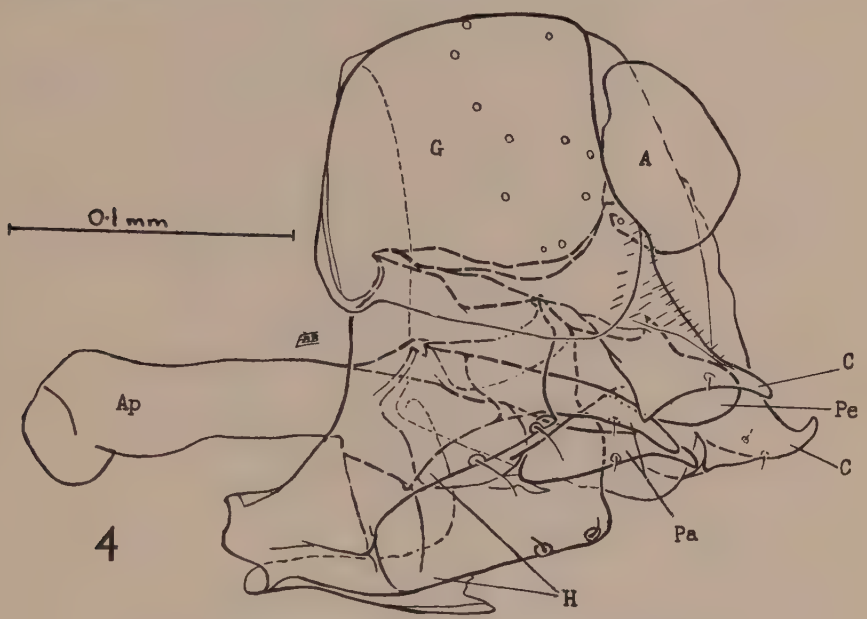


Fig. 4.—*C. punctum* (Mg.). Genitalia of specimen Wien 202.

Campichaeta obscuripennis (Mg.)

An easily recognised species, belonging to a different group in the genus from the two previous species. Head and antennae, including even their basal segments, dark. Thorax uniformly darker than in other species, without indications of stripes. Abdomen all dark, except second tergite usually pale at sides. Prehypopygial (seventh visible) segment of male with about 4 strong spines, which are decidedly stronger than marginal bristles on fifth segment; sixth segment hairy in both sexes. Legs pale, or with femora (especially hind pair) more or less darkened about middle. Wings more uniformly darkened, as in *griseola*, and costa *in both sexes* with distinct, spaced spines nearly to end of second section. Male genitalia as in figure 5, the claspers appearing to be closely fused, at their tips, with the genital arch, which is produced either side coextensively with the clasper as a broad lobe.

This appears to be a mid-European species. In Britain it is not uncommon in southern England, but without records from Scotland.

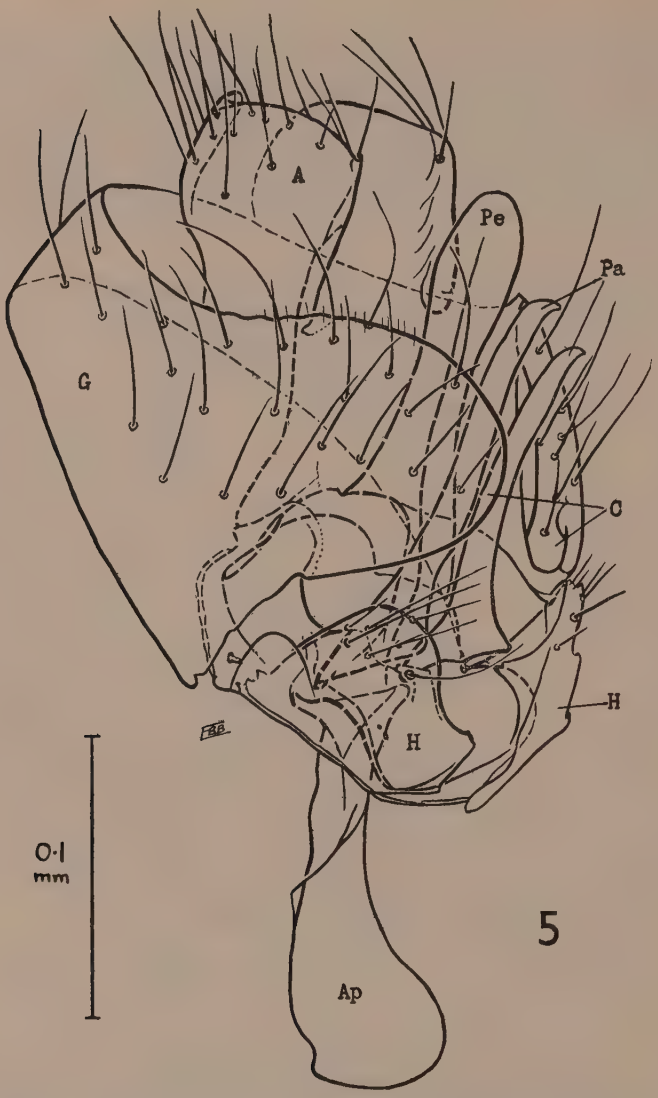


Fig. 5.—*C. obscuripennis* (Mg.). Genitalia of specimen Winth 183.

Addendum.

Thryptochaeta nigricornis Lw., 1864, *Berl. ent. Z.* **8** : 367.

Prof. Fritz Peus, Zoological Museum, Berlin, has since found 9 specimens (4 ♂, 5 ♀) of *T. nigricornis* in Loew's collection. All are *C. obscuripennis*. They are mostly in good condition and each has two recent, printed labels, "Coll. H. Loew" and "Type" (red label). Six bear a handwritten Loew label, *viz.*—♀, *Diast. 11.6. nigricorn. m.*; ♂, *var. ob-scuripes*; ♀, *17 : 5 : 57*; ♂, *Partink 8.67*; ♂ (no arista), *12/9 49*; ♀ (no head), *2/10 49*. It is obvious that the one

collected in 1867 cannot be one of the types, and that the one, " var. obscuripes " (a *nom. nud.*), was not considered as typical and should not be selected as lectotype.

The male of 12.9.49, although somewhat immature and wings not darkened and without arista, is selected and labelled by us as Lectotype of *nigricornis*. Its genitalia are now on a balsam pin-mount. The fourth male, without a Loew label, has no abdomen. We are grateful to Professor Peus for the loan of these specimens.

Old *Campichaeta* Specimens Examined

* = Genitalia on balsam pin-mount.

Specimen Ref. No.	Exact details of original labels (top one first). / = separate labels. Handwriting in *italics*. [With condition of specimens as received by us]	Present identification
	ex Fallén Collection	
	Sent as *Drosophila tristis*.	
*Fln 33	. *D. tristis* ♀ (Fallén's writing) [Antennae gone, R. wing torn.]	. *Campichaeta punctum*, ♂
	ex Zetterstedt Ins. Lappon. Coll.	
	Sent as *Geomyza griseola*.	
*Ztt " 82 "	. *O.G.* / *Bhn.* (Both Boheman's writing) / *Geomyza griseola Zett. n. sp.* ♂ *Ostr. 1852 a Boheman* (Zetterstedt's writing) / *Önskas få. veta. nammet på. denna. flug-art. Exemplaren. kunna. behållas. Boh* (Boheman's writing) (Translation—(I) should like to know the name of this fly-species. The specimen could be kept. Boheman). [Good. Ptilinum slightly extruded.]	*C. griseola*, ♂ Lectotype of *griseola*.
*Ztt " 83 "	. *O.G.* / *Bhn* (Both Boheman's writing) / *a Bohem 1852*(Zett. writing) (82, 83 are typical of Boheman specimens, being near top of pin and with his very small square labels.) [Good.]	*C. griseola*, ♂ Syntype of *griseola*.
*Ztt " 84 "	. *L-d 8/9* (Lund. Roth's writing. One label only). [Dirty and verdigrisy.]	. *C. punctum*, ♂
	ex Roth Coll.	
	Sent as *Geomyza griseola*.	
Roth " 85 "	. *Ld* (Roth's writing) / *Geomyz. gris=eola* ♂. *rar.* (sic) (Zetterstedt's writing.) [No abdomen. Some legs broken.]	. *C. punctum*, ♂
	ex Zetterstedt Dipt. Scand. Coll.	
	Sent as *Diastata costata*.	
Ztt " 494 "	. (Two letters, probably *Øs.* or *Gs.* ? Staeger's writing) / *D. costata* ♂ / *Geom. griseola Zett. obscurella Meig. non Fall.* ♂ *a Staeg.* (Both Zetterstedt's writing). [Good. Head restuck]	. *Diastata fuscula* (Fln.) sens Collin, 1911 (= *inornata* Lw. sens Duda, 1934), ♂

ex Boheman Coll.

Sent as *Geomyza* n. sp. Zett., teste Malaise.

*Boh *129* 56	. 19 specimens (11♂ 8♀). All with Boheman's labels, the lower label *Bhn*, the top label being *Hlm, Sm.*, or *O.G.* All typical of Boheman's specimens. Genitalia of 2 specimens, *Boh A*, *Boh B*, mounted. [Good.]	. *C. griseola*

ex Boheman Coll.

Sent as *Geomyza griseola* Zett, teste Malaise.

Boh *160* 56	. *Sc.* / *Roth* (Pinned by Roth, labelled by Boheman) [No abdomen. Antennae now damaged.]	. *C. punctum*, ♀

ex Zetterstedt Dipt. Scand. Coll.

Sent as *Diastata punctum.*

*Ztt " 485 "	. *246* (? Staeger's writing) / *D. Punctum* ♂. *Hafnia Stæg.* (Zetterstedt's writing.) [R. arista, R. legs broken.]	. *C. punctum*, ♂
Ztt " 486 "	. *Stæg* (Zetterstedt's writing) [Dirty. Some legs broken. No abdomen.]	. *C. punctum*, ♀
Ztt " 487 "	. *74* (? Staeger's writing. 7 not crossed). / *D. Punctum.* ♀. *Hafnia Stæg.* (Zetterstedt's writing). [Good.]	. *C. punctum*, ♀
Ztt " 488 "	. Dark maroon small square / *Sjörup* (? Zett's writing) [Good. Abdomen and L. wing were lost by us and thorax and legs damaged.]	. *C. punctum*, ♀

ex Zetterstedt Dipt. Exotica Coll.

Sent as *Diastata punctum.*

Ztt " 212 "	. Small pale green square / *38id* (Pink writing ? Dahlbom's) / *D. Punctum.* ♀ *Trawemün de Dahlb. 38.* (Zetterstedt's writing) [Good but dusty.] *466J.*	. *C. punctum*, ♀

ex Winthem Coll.

Nos. 183–184 sent as *Diastata luctuosa*; 185–6 as *D. fumipennis*; 187–8 as *D. obscuripennis*; 189–190 as *D. basalis*; 191–2 as *D. punctum*; 193 as *Opomyza* (*Diastata*) *circumdata.*

Winth 183	. *luctuosa* Coll. Winth. / Type (Printed on red label) [No head.]	. *C. obscuripennis*, ♂
Winth 184	. *luctuosa* Coll. Winth. / *luctuosa* (Old-looking label) Type (Red label) [3rd jts. ant. missing. Head gummy.]	. *C. obscuripennis*, ♂ Lectotype of *luctuosa.*
Winth 185	. *fumipenis* (sic) Coll. Winth. / Type (Red label) [3rd jts. ant. missing. Dorsum with hole and discoloured.]	. *C. obscuripennis*, ♀ Lectotype of *fumipennis.*
Winth 186	. *Lübeck Aug. 35* (? Winthem's writing) / *fumipenis* (sic) Coll. Winth. / Type (Red label) [Good.]	. *C. obscuripennis*, ♀
*Winth 187	. *obscuripen nis* Coll. Winth. / Type (Red label) [Eyes sunken. Only 1 leg.]	. *C. obscuripennis*, ♂ Lectotype of *obscuripennis.*

Winth 188 . *obscuripenis* (sic) Coll. Winth. / *obscuripennis* (Old-looking label) / Type (Red label) [End of abdomen after 4th seg. gone.] . *C. obscuripennis.* ♀

*Winth 189 . *basalis* Coll. Winth. / *basalis* (Old-looking label) / Type (Red label) [Ant. shrunken.] . *C. punctum,* ♂

Winth 190 . *Versaill.* (Not long s) / *basalis* Coll. Winth. / Type (Red label) [Arista gone.] . *C. punctum,* ♂

Winth 191 . *punctum* Coll. Winth. / *punctum* (Old-looking label) [Good.] . *C. punctum,* ♀

Winth 192 . *punctum* Coll. Winth. [No head or L. wing.] *C. punctum,* ♀

Winth 193 . Small pink square / *circumdata* Coll. Winth. / *Opomyza circumdata M* (? Winthem's writing) / Type (Red label) [Good.] . *C. punctum,* ♀

ex Various old Vienna Collections

194–5 sent as *Diast. obscuripennis*; 196–7 sent as *D. fumipennis*; 198–204 sent as *D. punctum.*

Winth 194 . *obscuripenis* (sic) Coll. Winth. / Type (Red label) [Good, thorax dented.] . *C. obscuripennis,* ♀

Wien 195 . *Pfarr-kirchen 27/7–* / *Thryptochaeta* (*Diastata*) *obscuripennis Mg.* = *nigricornis Lw.* [Good.] . *C. obscuripennis,* ♀

Wien 196 . Austria Alte Sammlung / *fumipēnis* (sic) det Schiner [No R. wing.] . *C. obscuripennis,* ♀

Winth 197 . *fumipenis* (sic) Coll. Winth. / *fumipennis* (Probably Meigen's label) / Type (Red label) [R. arista broken. Hole in dorsum.] . *C. obscuripennis,* ♀

Wien 198 . *punctum* det. Frauenf. [Good.] . *C. punctum,* ♂

*Wien 199 . Austria Alte Sammlung / *punctum* det. Schiner [Good.] . *C. punctum,* ♂

Wien 200 . Small bright red square / *Austria* Alte Sammlung / *punctum* det. Schiner [Rather dirty.] . *C. punctum,* ♀

Wien 201 . *Losoncr 1867 7* / *Kowarz Losons 1872* / *punctum* Alte Sammlung [Head shrunken. Pinned upside down.] . *C. punctum,* ♂

*Wien 202 . *Losoncr 1867 7* / *Kowarz Losons 1872* / *punctum* Alte Sammlung. [Good.] *C. punctum,* ♂

Wien 203 . *Losoncr 1867 7* / *Kowarz Losons 1872* / *punctum* det. Schiner [Abdomen twisted. Pinned through pleura.] . *C. punctum,* ♀

Egg 204 . Austria, Coll. Egger. / *punctum* det. Egger. / *Diastata punctum* (Grey-blue label ? Egger's writing) [Head shrunken. Pinned in the Continental manner through R. humerus.] . *C. punctum,* ♀

[All 7's on the above labels are crossed.]

ex Winthem Collection

Sent as *Diastata basalis.*

Winth 205 . *basalis* Coll. Winth. / Type (Red label) [Good.] . *C. punctum,* ♂

*Winth 206 . Coll. Winth. [Good.] . *C. punctum,* ♂

Winth 207 . Coll. Winth. [Abdomen gummy at end. Head shrunken.] . *C. punctum,* ♂

Winth 208 . Coll. Winthem. [Good. Ptilinum slightly protruding.] . *C. punctum,* ♂

Winth 209 . Coll. Winth. [Thorax with gash. Fly loose on pin so gummed on to the label.] . *C. punctum,* ♂

Winth 210	. Coll. Winth.	[Thorax split. Ptilinum well protruding.]	. *C. punctum*, ♀
Winth 211	. Coll. Winth.	[Thorax badly split.]	. *C. punctum*, ♀
Winth 212	. Coll. Winth.	[Thorax badly split.]	. *C. punctum*, ♀

The handwriting on the printed Winthem and Vienna labels resembles that of Olga Müller, as shown on Pl. 18, figures 51–52 of Horn and Kahle's *Über entomologische Sammlungen*, 1936. The old-looking labels noted for Winth. 184, 188, 189, 191 are all by one hand, with no long "s" and with the ink black and shiny, but do not agree with Meigen's writing. The old label on Winth 197 does appear to be in Meigen's hand and has the ink faded brown and dull.

We have not yet located Macquart's specimen(s) of *Campichæta rufipes*.

Key to Lettering of Figures

A, anal plate (or mesolobe).
Ap, apodome of penis.
C, clasper (or paralobe, inferior forceps).
G, genital arch (or genital shell).
H, hypandrium (or novasternum with ventral phragma, genital sternite).
Pa, paramere (or penial process).
(*pPa*). In *griseola* and *punctum* the posterior prolongations of hypandrium may represent posterior parameres (*pPa*), each with two hairs ventrally, which hairs are twice as far apart in *griseola* as in *punctum*).
Pe, penis
VII, 7^{M} tergite

A NEW ONYCHIURID COLLEMBOLAN FROM INDIA

By J. T. Salmon
(*University of Wellington, New Zealand*)

This is a further contribution in the series of papers dealing with the collection of Collembola made by Dr. T. Clay of the British Museum (Natural History) in India during 1952.

The species is described from a single specimen but as this specimen is very well preserved and quite clearly unique I have decided to describe it, and I have much pleasure in naming it after Dr. Clay who discovered it.

Spelaphorura clayae sp. n. (Figs. 1-6)

Colour : white.

Clothing : sparse, of mostly short, simple setae with a few long ones posteriorly ; the dorsal setae associated with the anal spines arranged as shown in figure 1.

Body : length 0·5 mm.; antennae a little shorter than the head in length, the 4 segments related as 5 : 11 : 32 [13 : 19], the third and fourth segments indistinctly divided ; sense organ of Ant. III as in figure 4, with 5 rather narrow, finely granulated papillae, 5 guard setae, 2 very large, reticulated, bulbous sense clubs (figs. 5 and 6) and 2 straight sense rods, 1 short and 1 long ; postantennal organ as in figure 3, situated in a deep oval depression and comprising 18 simple foliaceous vesicles with their inner ends noticeably thickened. Anal spines (fig. 1) on very small, well separated papillae, the spines faintly curved and subequal to the hind claw in length ; anal spines and papillae, claw and adjacent posterior setae related as 30 : 32 : 44.

First antennal segment and antennal base area with smaller granules than remainder of head and antennae. Pseudocelli, except for a single large, very heavily chitinised one on lower surface of head on each side almost directly below the postantennal organ, all small, faintly chitinised and difficult to detect ; arranged as follows :

Ant. base, 2 + 2
Post margin of head, 2 + 2.

Th. I. absent, Th. II, Th. III and abd. II each 1 + 1, no pseudocelli visible on any other segments.

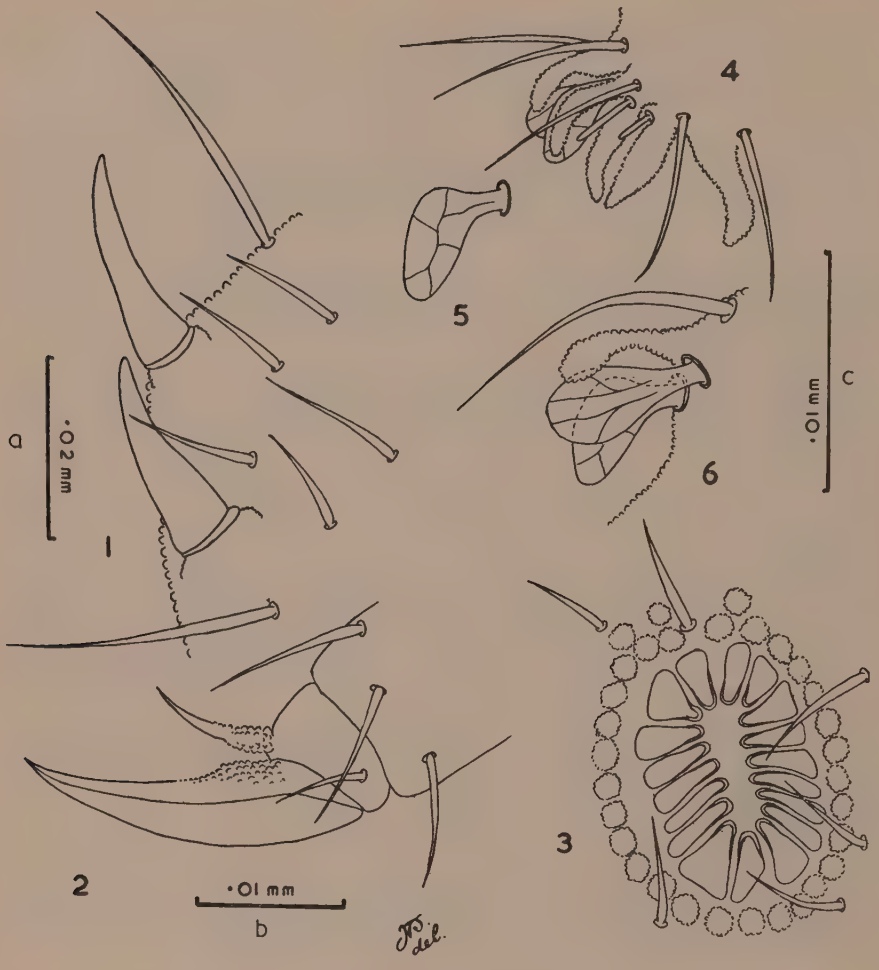
Furcal ridge absent.

Foot : claw without any teeth but basally granulated and with a fairly long basal seta to each side ; unguiculus about half as long as claw with distinct bulbous granulated lamella and needle-like extension (fig. 2).

Locality.—India : Gangtok, Sikkim, 6000 feet, 11.xi.1952, amongst dry and rotting leaves.

Remarks.—I have placed this species in Bagnall's genus *Spelaphorura* as redefined by me in a paper just going to the press. *S. clayae* appears to be an almost unrelated species not displaying affinities with any known species of Onychiuridae.

Holotype.—Deposited in the British Museum (Natural History), London.



Spelaphorura clayae sp. n.

(Drawn from holotype)

FIGS. 1–6.—(1) Anal spines showing papillae and adjacent related setae; (2) hind claw; (3) postantennal organ; (4) sense organ of Ant. III; (5) sense club from sense organ of Ant. III; (6) papilla and sense clubs from sense organ of Ant. III, viewed from side.

(*a*) Scale for figure 1; (*b*) scale for figures 2, 3 and 4; (*c*) scale for figures 5 and 6.

SOME NEW SPECIES OF *ONYCHIURUS* GERVAIS (COLLEMBOLA: ONYCHIURIDAE) FROM NEPAL AND UGANDA

By D. K. Choudhuri

(*Department of Zoology, Imperial College, London, S.W.7*)

The specimens described below form part of a collection made during the British Museum (Natural History) Expedition to Nepal in 1952 and to Ruwenzori, Uganda, in 1954. I am indebted to Dr. T. Clay and to the Trustees of the Museum for making the material available to me for study.

Onychiurus himalayensis sp. n.

Colour : creamy-white in specimens preserved in alcohol.

Size : length of largest specimen, excluding antennae, 1·8 mm.

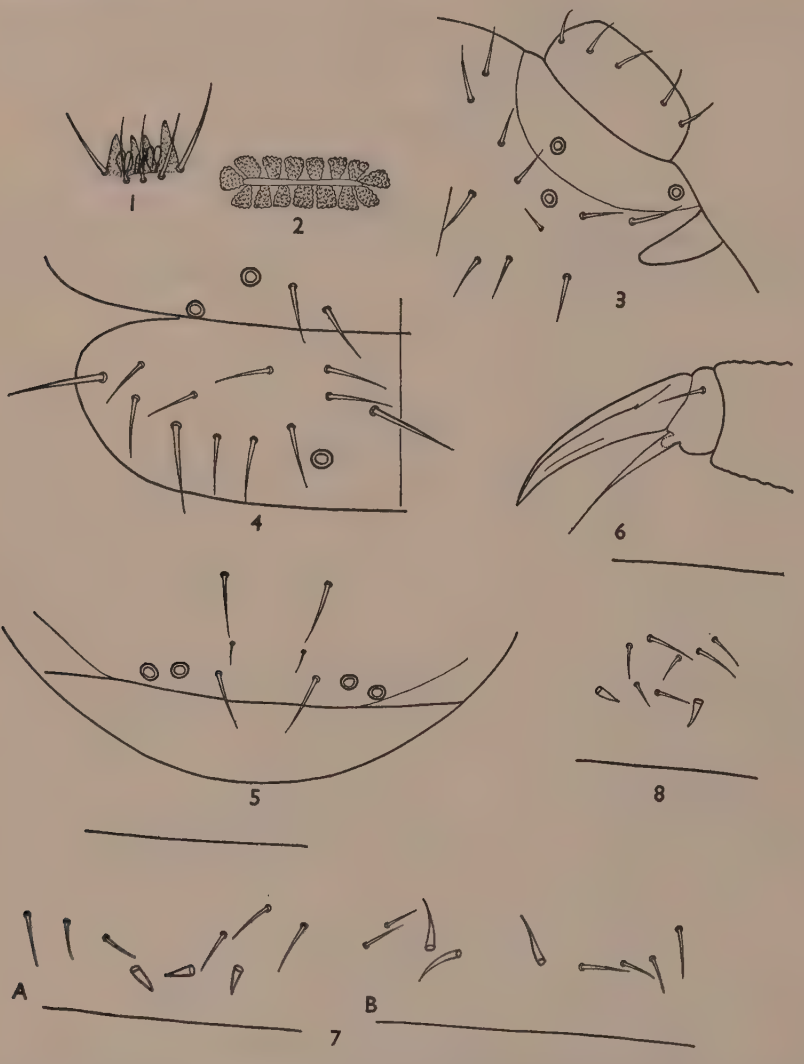
Cuticle : with moderately coarse dorsal granules on trunk, coarser on upper surface of head, especially anteriorly; antennal bases delimited by their fine granulation.

Pseudocelli : dorsal pseudocelli arranged as follows: three at base of each antenna, in the form of a right-angled triangle (fig. 3), two being on antennal base and the third just outside it; two obliquely placed pseudocelli present on hind margin of head (fig. 4); Th. I, one on each side placed close to mid-line and behind line of curvature of bases of posterior row of setae (fig. 4); Th. II–Abd. III, three pseudocelli on each side, the median one near the mid-line, the second dorsolaterally and near the hind margin and the third laterally (the latter placed more anteriorly on thoracic than on abdominal tergites); Abd. IV on each side with four pseudocelli of which two lie close together obliquely near the mid-line, the third at the posterolateral corner and the fourth anterior to the third; Abd. V with two obliquely placed pseudocelli (fig. 5). Ventrally pseudocelli arranged as follows: head with three on each side (one anterior, the second some distance behind it and the third in the posterolateral region); Th. I without pseudocelli; Th. II and III each with one on either side very close to mid-line; Abd. I with two on each side (one near posterobasal region of ventral tube and the other placed laterally); Abd. II with one lateral pseudocellus on each side; Abd. III with one ventromedian and one lateral on each side; Abd. IV with one median pseudocellus only on each side; subcoxae each with two pseudocelli.

Clothing : body clothed with short setae on anterior and median parts of tergites and also on sternites; some longer setae inserted laterally (one on each subcoxa, some on tergites of Abd. I–VI) and on dorsal surface of last abdominal segment; Ant. I with eight setae of which five are dorsal (fig. 3); head anteriorly with setae as in figure 3; 2 + 2 obliquely placed setae (fig. 4) on its hind margin between the two sets of pseudocelli; chaetotaxy of Th. I as in figure 4; median region of Abd. II with ten setae arranged in four longitudinal rows of which anterior one of outer row the largest; median setae of Abd. V arranged as in figure 5; sixth abdominal tergite with five longer setae in addition to some short and intermediate ones; ventral tube without basal seta but usually with five setae of which four form an inner row; male ventral organ consists of three conical setae on sternite of Abd. II and a similar pair on sternite of Abd. III (figs. 7*A*, *B* and 8).

Body : antennae shorter than width of head (21 : 28); Ant. IV apically with a crescentic fold housing a very small globular papilla; Ant. org. III of four broad, high, finely granulated, unequal papillae and five slender guard setae protecting two stout, relatively short sensory rods and two smooth erect, ovoid sensory clubs which are bifid at the tip (fig. 1); postantennal organ (fig. 2) with 12–15 compound vesicles not touching each other. Unguis

with or without lateral teeth ; no inner tooth found ; unguiculus without basal lamella, slightly shorter than claw (23 : 25) and with the tip drawn into a fine needle (fig. 6). Furca and anal spines absent.

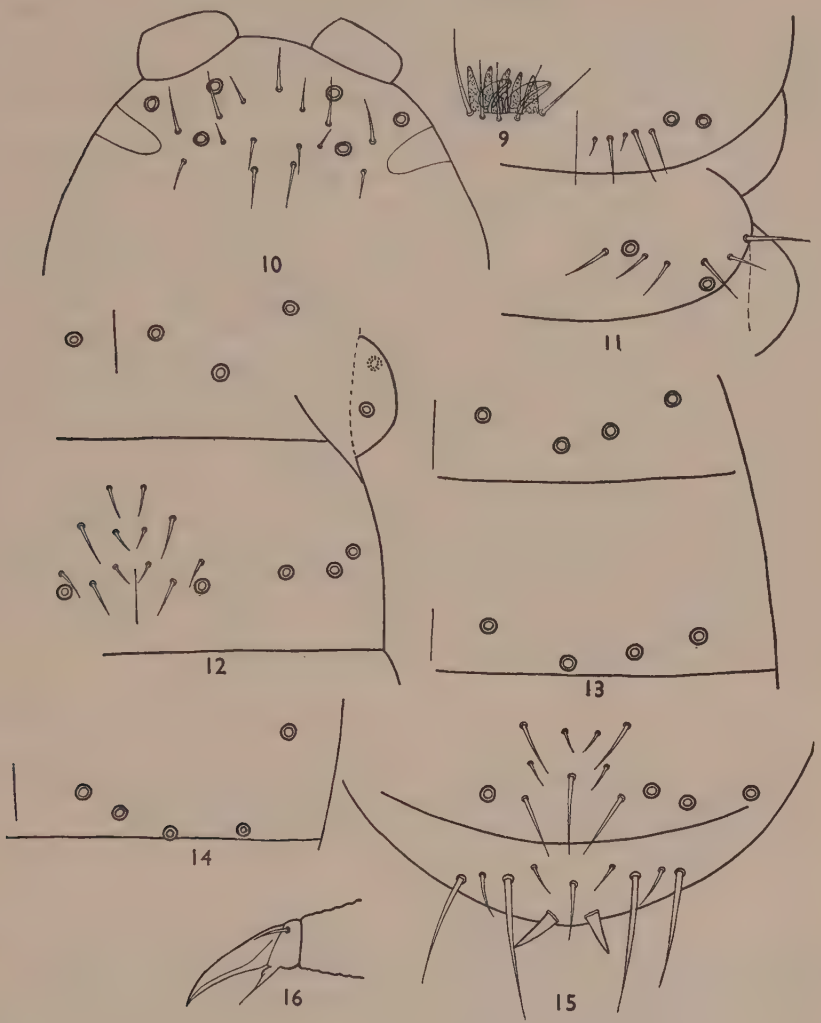


FIGS. 1–8.—*Onychiurus himalayensis* sp. n. (1) Sense organ on Ant. III ; (2) postantennal organ ; (3) setae on anterior part of head and Ant. I ; (4) pseudocelli and setae on posterior part of head and Th. I ; (5) tergite of Abd. V showing mid-dorsal setae ; (6) hind unguis ; (7) *A*, ventral organ on Abd. III ; *B*, the same in another specimen ; (8) ventral organ on Abd. II.

Type locality.—NEPAL : Bakhri Kharka, 5500 feet, amongst damp moss, 24.iv.1954 (*Mr. K. H. Hyatt*).

Other localities.—NEPAL : Sikha, 8000 feet, amongst barley husks, 24.v.1954 ; Siklis, 7000 feet, in sandy turf, 20–21.iv.1954 ; Gurjakhani, 8500 feet, in

rotting barley husks in ant's nest, 24–27.vi.1954 (*all Mr. K. H. Hyatt*). The holotype (mounted in polyvinyl-lactophenol) and some paratypes are in the British Museum (Natural History).



Figs. 9–16.—*Onychiurus gurjakhanii* sp. n. (9) Sense organ on Ant. III; (10) anterior part of head showing chaetotaxy; (11) setae on posterior part of head and Th. I; (12) part of Th. III and Abd. I showing pseudocelli and setae; (13) part of Abd. II and III showing pseudocelli; (14) part of Abd. IV showing pseudocelli; (15) tergites of Abd. V and Abd. VI showing pseudocelli and setae; (16) hind unguis.

This species by virtue of its compound vesicles, absence of anal spines and furcula, its smooth, straight sense clubs in Ant. org. III, the presence of one pseudocellus on each side of the tergite of Th. I and the alamellate unguiculus, would appear to be close to *O. justi* Denis, 1938, and *O. novae-zealandiae* Salmon,

1942, but it is clearly separate from both species by its very characteristic ventral organ and the distribution of the pseudocelli.

Onychiurus gurjakhanii sp. n.

Colour : slightly yellowish in specimens preserved in alcohol.

Size : length of largest specimen, excluding antennae, 1·1 mm.

Cuticle : finely and almost uniformly granulated except on head where granules a little coarser ; antennal bases not delimited.

Pseudocelli : dorsally arranged as follows : three in region of antennal base (fig. 10) ; hind margin of head with two transversely placed pseudocelli (fig. 11) ; those of Th. I–III arranged as in *O. duplopunctatus* (Strenzke, 1954) (figs. 11 and 12) ; Abd. I–III each with four on either side, as in figure 13 ; 5 + 5 pseudocelli on Abd. IV as in figure 14 ; Abd. V with three on either side, the median two obliquely placed and the third dorsolateral (fig. 15) ; ventrally only one pseudocellus on each side of head ; subcoxae with two on each.

Clothing : body sparely clothed with short, medium and long setae ; anterior part of head with chaetotaxy as in figure 10 ; a row of five setae (fig. 11) on each side of hind margin of head, between the two sets of pseudocelli ; Th. I with a posterior row of six setae, of which three are long and three of medium length (fig. 11) ; ten setae in four rows present on mid-dorsal region of Abd. II (fig. 12) ; lying between the left and right groups of pseudocelli on Abd. V are five long setae in addition to some four to five shorter ones (fig. 15) ; setae of Abd. VI as in figure 15 ; male without ventral organ.

Body : antennae slightly shorter than width of head (8 : 9) ; Ant. org. III (fig. 9) of five narrow, finely granulated papillae, five protective setae, two stout, smooth, canaliculated and inclined sensory clubs, and two short, narrow, simple sense rods ; apex of Ant. IV with a crescentic fold housing a minute globular papilla ; postantennal organ with 16–20 contiguous multilobed vesicles. Unguis (fig. 16) untoothed ; unguiculus with a distinct basal lamella ; ratio of unguis : unguiculus 8 : 4. Furca absent. Anal spines slender, very weakly curved and mounted on low papillae (fig. 15).

Type locality : NEPAL : Ulleri, dry soil of deciduous forest, 6 specimens (4 ♀, 2 ♂).

Holotype (mounted in polyvinyl-lactophenol) and paratypes (in alcohol) are in the collection of the British Museum (Natural History).

In certain body markings this species closely resembles *O. ortus* Denis, but is distinguished from it by its pseudocelli.

Onychiurus richardsi sp. n.

Colour : creamy-white in specimens preserved in alcohol.

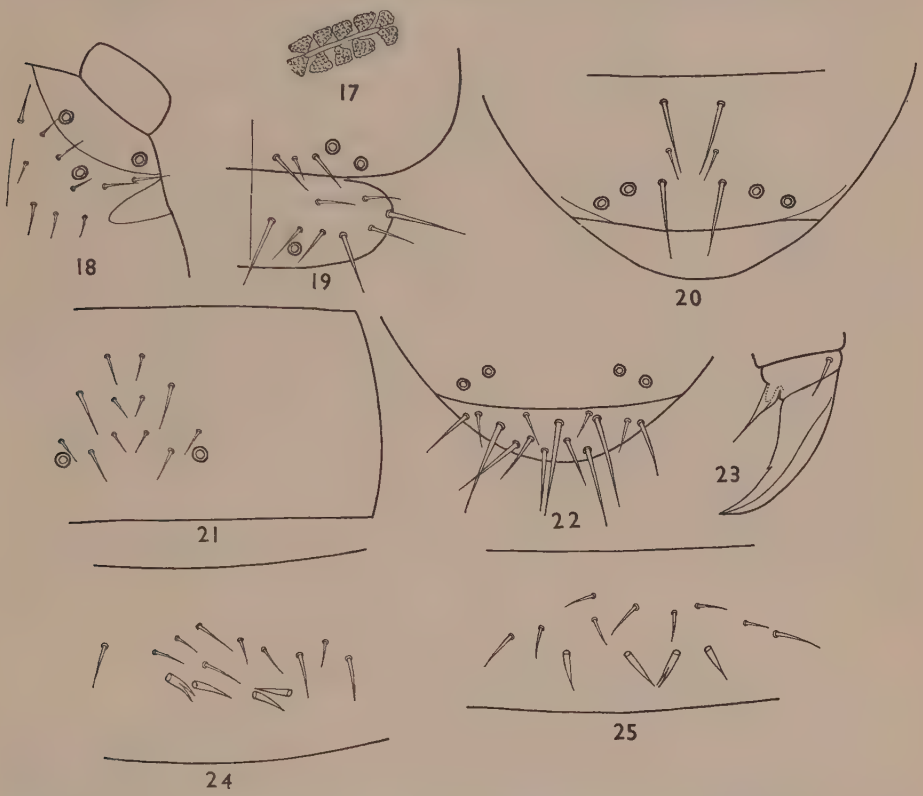
Size : length of largest specimen examined, excluding antennae, 1·7 mm.

Cuticle : finely and uniformly granulate ; antennal base delimited by a slightly finer granulation.

Ocelli : Dorsally pseudocelli arranged as follows : three at base of each antenna arranged in a right-angled triangle (fig. 18) ; of these, two are on antennal base and the third just external to it ; two on each side of posterior margin of head (fig. 19) ; Th. I with one on each side close to mid-dorsal line and behind posterior row of setae (fig. 19) ; Th. II and III each with two on either side (one submedian and the other lateral) ; Abd. I–III each with three on either side, arranged as in *O. novae-zealandiae* Salmon, 1942 ; Abd. IV with four on each side, of these, two obliquely placed lying near together and close to mid-line, the third situated near posterolateral corner of tergite and the fourth anterior to the third ; Abd. V with two obliquely placed pseudocelli not far from the mid-line (fig. 20). Ventrally two pseudocelli present on each side of head (one anterior and the other

posterolateral); ventral pseudocelli absent from Th. I–III; Abd. I–Abd. III each with one lateral pseudocellus on either side; Abd. IV with a submedian one on each side; each subcoxa with two pseudocelli.

Clothing: body clothed with short, medium and some long setae; the long setae arranged as follows: one on each subcoxa, a few laterally on Abd. V and VI and some on dorsal surface of Abd. VI; Ant. I bears eight setae of which five are dorsal; chaetotaxy of anteromedian part of head as in figure 18 and that of posteromedian region as in figure 19; Th. I dorsally with two rows of setae, the posterior row fairly constant with six to seven



FIGS. 17–25.—*Onychiurus richardsi* sp. n. (17) Postantennal organ; (18) right side of anterior part of head showing pseudocelli and setae; (19) right half of posterior part of head and tergite of Th. I showing setae and pseudocelli; (20) tergite of Abd. V showing pseudocelli and mid-dorsal setae; (21) setae on middle part of tergite of Abd. II; (22) setae on tergite of Abd. VI; (23) hind unguis; (24) and (25) ventral organ.

setae of which three are long (fig. 19); median dorsal region of Abd. II with ten setae arranged as in figure 21; six setae arranged in three pairs in a similar position on Abd. V (fig. 20); last abdominal tergite with five long setae in addition to some short and medium ones (fig. 22); no basal seta on ventral tube but five or six setae arranged in two rows (the inner of which is composed of four setae); male ventral organ, as in *O. gridelii* Denis (*sensu* Gisin), with four setae on Abd. II and four on Abd. III; in *O. richardsi* sp. n. these modified as short stout setae (figs. 24 and 25), one or two being occasionally bifid apically but never in the specimens examined fringed like those of *O. stachianus* Bagnall.

Body : antennae shorter than width of head (11 : 14) ; apex of Ant. IV with a crescentic depression housing a minute globular papilla ; Ant. org. III composed of four finely granulate fairly high papillae, a pair of simple median sensory rods on either side of which is a smooth, straight canaliculated sense club, the organ protected by five setae of which the outermost is the largest ; postantennal organ composed of 9–15 compound vesicles (fig. 17). Unguis (fig. 23) with a minute inner tooth a little more than half-way along the margin (this tooth sometimes absent) ; no lateral teeth seen ; unguiculus basally lamellate and shorter than unguis (8 : 15). Furca and anal spines absent.

Type locality.—Uganda : Ruwenzori, amongst litter in humus under bamboo bush, near Nyinabitaba, 12.vii.1952 (*Dr. G. O. Evans*).

Uganda : Ruwenzori, amongst litter on soil in the dense rain forest near Mahoma River, 14.viii.1952 (*Dr. G. O. Evans*).

The holotype (mounted in polyvinyl-lactophenol) and the paratypes (in alcohol) are preserved in the British Museum (Natural History).

This species belongs to the group of *Onychiurus* having ovoid, straight sensory clubs in Ant. org. III and pseudocelli on the prothoracic tergite ; consequently it would appear to come near to *O. justi* Denis (pro *fimetarius* Folsom), *O. variabilis* Stach and *O. novae-zealandiae* Salmon. It is separated from the first of these by the toothed claw, the number of pseudocelli on Abd. IV and V and the type of cuticular granulation ; it differs from *O. variabilis* in the type of sense clubs, the different number of pseudocelli, the different type of ventral organ in the male and in the non-circular outline of the postantennal organ vesicles ; from the last of the three species it differs in the absence of lateral teeth on the unguis, the shorter unguiculus and the number of pseudocelli on the hind margin of the head and on Abd. tergite IV.

I have pleasure in naming this new species after Professor O. W. Richards in whose department this work has been carried out and to whom I am deeply grateful.

Onychiurus ugandensis sp. n.

Colour : pale yellow in alcohol preservation.

Size : length of body, excluding antennae, *ca.* 1·2 mm.

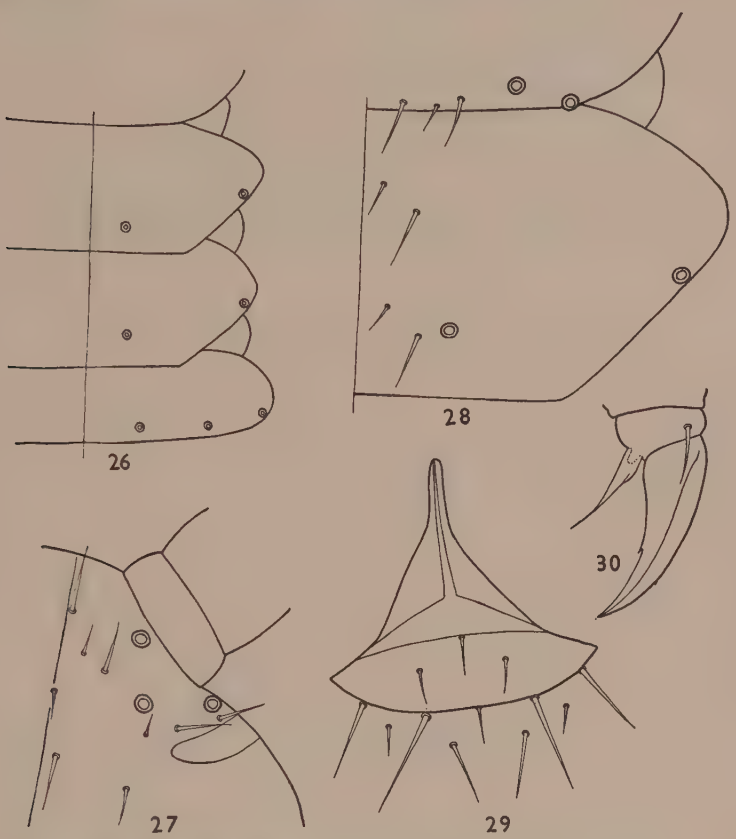
Cuticle : cuticular granules uniformly fairly fine.

Pseudocelli : dorsal pseudocelli arranged as follows : two on each antennal base and a third one just outside it, the three together forming a right-angled triangle (fig. 27) ; hind margin of head with two obliquely placed on each side (fig. 28) ; pro- and mesothoracic tergites each with two on either side (one dorsal and one lateral but slightly anterior to the former) (fig. 26) ; Th. III–Abd. III each with three on either side close to posterior margin of segment (the lateral one placed slightly anterior to the others) ; Abd. IV with four on either side arranged as in *O. richardsi* sp. n. ; Abd. V with two, slightly obliquely placed. Ventrally a single pseudocellus present on either side of head ; none ventrally on Th. I–Abd. I ; one on each side of sternites of Abd. II–IV (of these, that on Abd. IV is close to the mid-line, the remainder postero-lateral) ; each subcoxa with a single pseudocellus only.

Clothing : body clothed with short, medium and some long setae ; the long setae arranged as follows : one on each subcoxa, at least one pair on posterior part of each tergite, a few on sides of tergites and some on the last abdominal segment ; anteromedian chaetotaxy of head as in figure 27, hind margin of head with three setae on each side, the median one relatively small ; arrangement of setae on mid-dorsal region of Th. I characteristic of the species ; eight setae arranged in four parallel rows, the outer rows bearing the longer setae (fig. 28) ; median anal valve armed with 1 (1) 1 setae (fig. 29) ; ventral tube

without either basal or anterior setae but distally bearing six, four of which belong to an inner row.

Body : shape, especially in thoracic region, very characteristic (fig. 26); prothoracic tergite longer than either Th. II or III (6·5 : 5·5 : 3·5); antennae shorter than width of head (1·4 : 2·4); Ant. IV relatively large and bearing, at its tip, a crescent-shaped fold with a very minute globular papilla; relative lengths of Ant. I–IV as 0·7 : 1·9 : 2·0 : 6·2; Ant.



Figs. 26–30.—*Onychiurus ugandensis* sp. n. (26) Right half of Th. I–III; (27) anterior part of head; (28) posterior part of head and tergite of Th. I; (29) setae on median anal valve; (30) hind unguis.

org. III consisting of two straight, smooth sense clubs each with a central canal, two prominent sense rods protected by four moderately high, finely granulated papillae and five guard setae of which the outer one the longest; postantennal organ consisting of 14 compound vesicles all distinctly separated; unguis with a distinct tooth a little more than half-way along inner margin of claw (fig. 30), no lateral teeth seen; unguiculus shorter than unguis (3 : 4·5) and basally lamellate. Neither furca nor anal spines present. As the single specimen examined is a female nothing is known of the ventral organ.

Type locality.—Uganda: Ruwenzori, amongst dry litter under hardwood stand near Bundibugyo, 3400 feet, 2.ix.1952. (*Dr. G. O. Evans.*)

The holotype is in the British Museum (Natural History).

Although represented by only a single specimen, this species has been erected mainly on account of its very characteristic shape (particularly of the thorax) but also because of the arrangement of the setae on the median part of Th. I.

References

Bagnall, R. S., 1939, Notes on British Collembola. *Ent. mon. Mag.* **75** : 101.

Denis, J. R., 1938, Collemboles d'Italie (principalement cavernicoles). *Boll. Soc. Adriat. Sci. nat., Trieste* **36** : 104–5.

Salmon, J. T., 1942, A new species of *Onychiurus* (Collembola) from New Zealand. *Trans. roy Soc. N.Z.* **72** : 158–9.

Stach, J., 1954, *The apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Fam. Onychiuridae* : 164–7 Krakow.

Strenzke, K., 1954, Verbreitung und systematik der Collembolen der deutschen Nord und ostseekuste. *Veroff. Inst. Meeresf. Bremerhaven* **3** : 50–51.

ON TWO NEW SPECIES OF *ONYCHIURUS* GERVAIS (COLLEMBOLA : ONYCHIURIDAE) FROM THE BRITISH ISLES

By D. K. Choudhuri

(*Department of Zoology, Imperial College, London, S.W.*7)

Onychiurus parthenogeneticus sp. n.

Colour : white.

Size : maximum length, excluding antennae, 1·6 mm.

Cuticle : uniformly covered with moderately fine granulations ; antennal bases not delimited by modified granulation.

Pseudocelli : dorsal pseudocelli arranged as follows : head as in figure 1 ; prothorax, two on each side (fig. 2) as in *O. duplopunctatus* (Strenzke, 1954) ; Th. II–Abd. III, three on each side arranged as in *O. novae-zealandiae* (Salmon, 1942) ; Abd. IV, four on each side, the two most dorsal in each group being situated obliquely and close together near the mid-line of the dorsum, the third near the posterolateral region of the tergite and the fourth somewhat anterior to the third ; Abd. V, three on each side arranged as in Abd. IV except that the anterolateral one on each side is missing. Ventrally pseudocelli arranged as follows : head, an anterior and a posterolateral pseudocellus present on each side ; Th. I–Abd. I without pseudocelli ; Abd. II–III each with one placed laterally on each side ; Abd. IV, two on each side, one near the mid-line and the other lateral ; subcoxae each with two pseudocelli.

Clothing : body sparely clothed with short, medium and long setae (only those considered of systematic importance are dealt with here) ; at least three pairs of setae of medium length arranged on tergites of Th. I–Abd. V ; one long seta on each subcoxa and some on Abd. VI ; head with setae arranged antero- and posterodorsally as in figure 1 ; Ant. I with five dorsal and three ventral setae ; chaetotaxy of Th. I as in figure 2 ; subcoxae each with four setae of which the posterior is the largest ; setae of Abd. II and V as in figures 3 and 4 respectively ; tergite of Abd. VI bears two median setae of which the posterior one is the longer ; setae of ventral tube (fig. 5) as in *O. duplopunctatus* and those of upper anal valve as in figure 9.

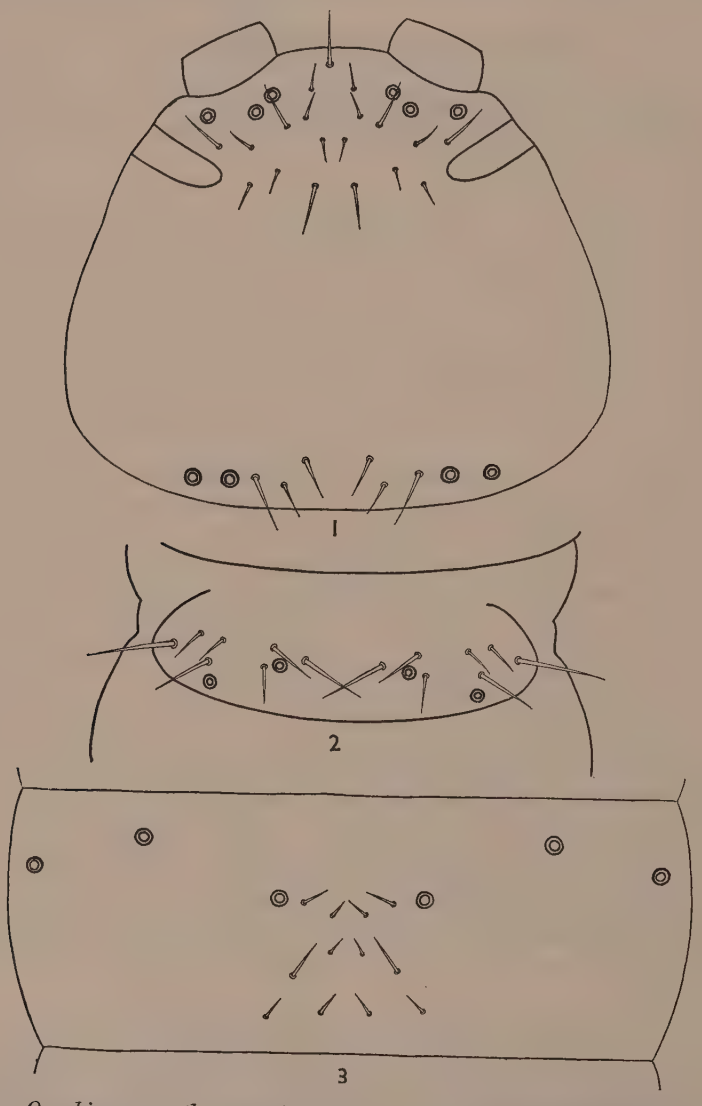
Body : postantennal organ (fig. 6) with 18–29 simple ovate vesicles, often furnished with secondary basal lobes, antennal length to head-width 28 : 35 ; relative lengths of segments I–IV as 3 : 5 : 7 : 12 ; Ant. org. III with five narrow, moderately high, conical, finely granulate papillae ; five protective setae of which the outer one is the largest ; two slender sense rods placed close together and two coarsely granulated sense clubs each with a central canal (fig. 7) ; apex of Ant. IV with a depression containing a minute globular papilla. Unguis (fig. 8) usually without inner or lateral teeth (rarely with a minute basolateral tooth) ; unguis III longer than I or II (unguis I : III = 31 : 37) ; unguiculus without basal lamella and shorter than unguis (31 : 37, measuring the unguis from tip to inner base). Anal spines slightly curved and placed on distinct but low papillae. Furca entirely absent.

Specimens from the type locality have been reared in the laboratory through many generations without the appearance of a single male. Specimens from East Africa in the British Museum include some which are considered to be conspecific with the holotype of *O. parthenogeneticus* ; these are also all female.

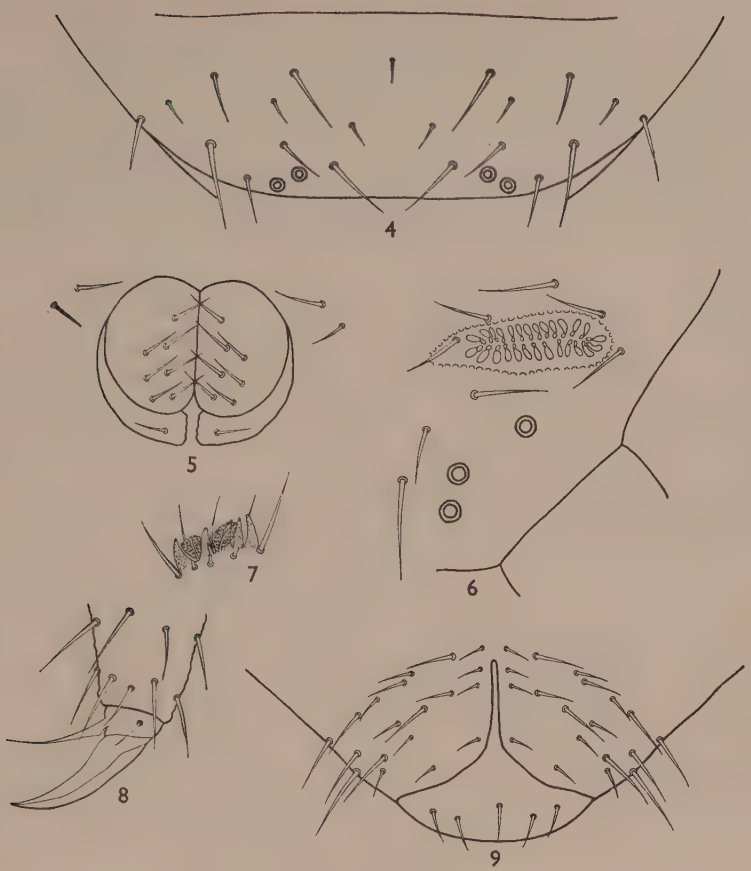
PROC. R. ENT. SOC. LOND. (B) 27. PTS. 9–10. (OCTOBER, 1958).

In certain characters this species resembles *O. hortensis* Gisin, 1949, from which it can be clearly separated by the presence in *hortensis* of (1) a single pseudocellus on each side of the under surface of the head, (2) a single subcoxal pseudocellus on each leg, (3) anal spines without distinct papillae, (4) distinctly delimited antennal bases, (5) only 4 + 2 setae distally on the ventral tube, (6) a postantennal organ with 25 contiguous vesicles as opposed to separate ones in *parthenogeneticus* and (7) sense clubs without a central canal.

Type locality.—ENGLAND : Silwood Park, Berks., amongst damp moss near stream, many specimens, 7.i.1957.



FIGS. 1–3.—*Onychiurus parthenogeneticus* sp. n. (1) Dorsal surface of head showing pseudocelli and setae on its anterior and posterior part ; (2) setae on tergite of Th. I ; (3) setae on middle part of tergite of Abd. II.



FIGS. 4–9.—*Onychiurus parthenogeneticus* sp. n. (4) Setae on tergite of Abd. V; (5) setae on ventral tube; (6) postantennal organ; (7) sense organ on Ant. III; (8) hind unguis; (9) setae on upper anal valves.

Other localities.—EAST AFRICA, UGANDA: Ruwenzori, Mukuba River near Dkandar, amongst moss on the river bank, 1.viii.1952.

The holotype (mounted in polyvinyl-lactophenol) and some paratypes (in alcohol) have been deposited in the British Museum (Natural History). Further material, including living specimens, has been retained at Imperial College.

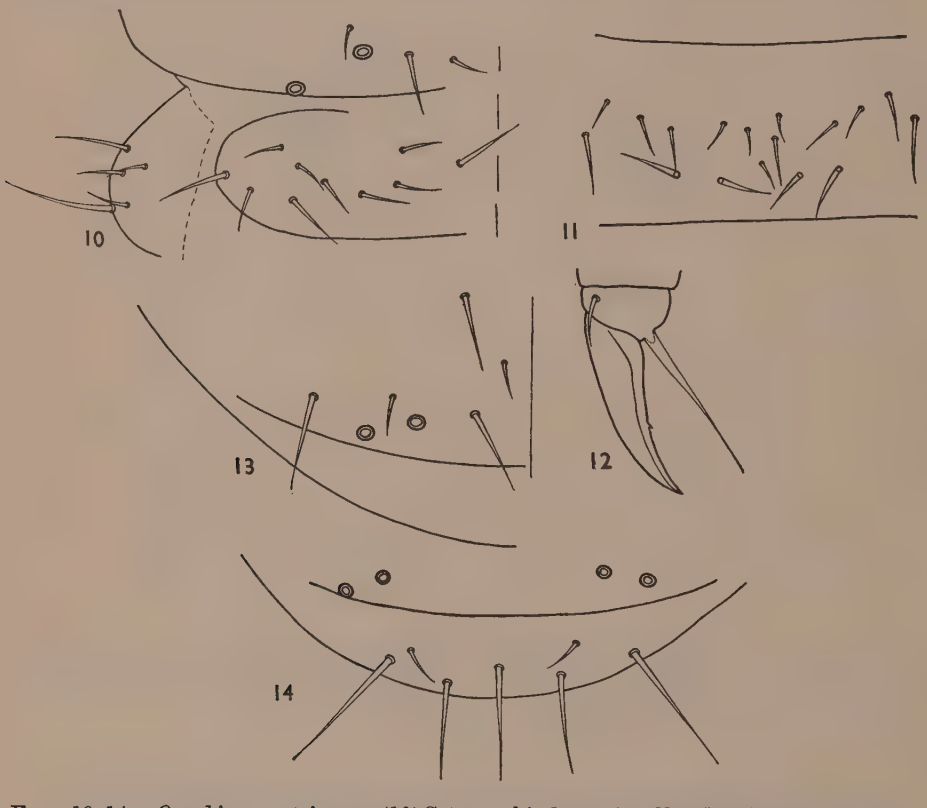
Onychiurus gotoi sp. n.

Colour : creamy-white in life and in specimens preserved in alcohol.

Size : maximum length, excluding antennae, 1·75 mm.

Cuticle : cuticular granulation coarse, particularly on anterodorsal surface of head and to a lesser extent on other parts of upper surface of head; antennal bases sharply delimited by fine granules.

Pseudocelli : dorsal pseudocelli arranged as follows : head, each antennal base with a pair which, with the one lying immediately adjacent, forms a right-angled triangle ; hind margin of head with a pair of obliquely placed pseudocelli on each side ; Th. I without pseudocelli ; Th. II and III each with two on either side, all four being arranged in a transverse line ; Abd. I–III each with three on either side, in each group of three the median one is separate from the other two, which lie more laterally and are arranged obliquely ; Abd. IV with four on each side of which two are submedian, one in the posterolateral corner of the tergite and the last one anterior to it ; Abd. V with a pair of obliquely placed pseudocelli on either side. Ventrally pseudocelli arranged as follows : head on either



Figs. 10–14.—*Onychiurus gotoi* sp. n. (10) Setae on hind margin of head and Th. I (tergite) ; (11) ventral organ ; (12) hind unguis ; (13) setae on Abd. V ; (14) setae on Abd. VI.

side with one anterior and a pair of posterior pseudocelli (of the latter, one is submedian and the other lateral) ; Th. I–III without pseudocelli ; Abd. I–IV with one on each side (those on I, II and III posterolateral and those on IV submedian) ; subcoxae each with two pseudocelli.

Clothing : body sparsely clothed with short, medium and long setae (the following description is limited to that part of the chaetotaxy considered to be of taxonomic importance) ; anterior part of head with setae arranged as in *O. parthenogeneticus* sp. n. ; setae between posterior cranial pseudocelli four in number, the outer ones being the longer (fig. 10) ; setae of Ant. I as in *O. parthenogeneticus*, chaetotaxy of Th. I as in figure 10 ; subcoxa I with five setae of which the most posterior is the longest (subcoxae of all legs

are provided with a long seta); Abd. II, between subdorsal pseudocellus of either side, with twelve setae arranged in four almost parallel longitudinal rows (the most antero-lateral seta on each side slightly displaced towards the lateral margin of the segment); setae of outer rows distinctly longer than those of the two median rows; the six setae on mid-dorsal region of Abd. V arranged in three transverse rows, the middle ones being shorter than those of the other two rows (fig. 13); Abd. VI with some long setae as in figure 14, the ventral tube with neither basal nor anterior setae but distally bearing seven setae arranged in two rows, the inner one bearing four setae; ventral organ in males (fig. 11) represented by four slightly modified setae on Abd. II only.

Body : postantennal organ consisting of eight to twelve compound vesicles; antennae shorter than head width (16 : 21); relative lengths of Ant. I–IV as 2 : 4 : 4 : 6; apex of Ant. IV with a crescent-shaped fold housing a very minute papilla; Ant. org. III of two sense rods and two straight, ovoid, smooth sense clubs, each with apical depressions protected by four finely granulate, moderately high papillae and five setae (*stachianus/gridellii* type). Unguis (fig. 12) with a distinct inner tooth approximately mid-way along inner margin of claw; lateral teeth absent; unguiculus without basal lamella and with its apex reaching slightly beyond that of unguis; furca and anal spines absent.

This species is apparently very close to *O. sinensis* Stach, 1954 but differs from it in that the latter has a ventral organ composed of four short, thick rod-like sensory setae split on their upper edge, claws always with lateral teeth and usually three setae on subcoxae I.

Type locality.—England: London, Chelsea Physic Garden, from soil of potted plants in hot-house, 12.x.1957.

Other localities.—England: Cambridge, hot-house of Botanic Gardens, 13.iv.1957 (*A. H. G. Alston*); Surrey, hot-house of Royal Botanic Gardens, Kew, 22.x.1957 (*A. H. G. Alston*); Berkshire, Silwood Park, greenhouse, 17.vi.1958 (*H. E. Goto*).

The holotype (mounted in polyvinyl-lactophenol) and some paratypes are in the British Museum (Natural History).

Acknowledgments

The author has pleasure in naming the second species after Mr. H. E. Goto, of Imperial College, whose aid in procuring the material, including the holotype, and .whose advice have been invaluable. To Prof. Jan Stach of Krakow, Poland, who sent specimens of *O. sinensis* Stach, 1954, together with additional information, the writer is also deeply indebted.

References

Gisin, H., 1949, Notes sur les Collemboles avec descriptions de quatorze espèces et d'un genre nouveaux. *Mitt. Schweiz. ent. Ges.* **22** : 398–9.

Salmon, J. T., 1942, A new species of *Onychiurus* (Collembola) from New Zealand. *Trans. roy. Soc. N.Z.* **72** : 158–9.

Stach, J., 1954, *The apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Fam. Onychiuridae* : 64–65. Krakow.

Strenzke, K., 1954, Verbreitung und Systematik der Collembolen der deutschen Nord und Ostseekuste. *Veroff. Inst. Meeresf. Bremerhaven* **3** : 50–51.

SOME FLIES OF THE FAMILY ASILIDAE (DIPTERA) FROM AUSTRALIA AND BRAZIL

By Frank M. Hull
(*University of Mississippi*)

Some apparently undescribed robber flies of especial interest have appeared among a small collection of flies lent by the British Museum (Natural History) and are here described.

Chrysopogon whitei sp. n.

Distinguished from all other described species by the bare aspect and general yellowish-brown colour ; mesonotum sepia, the spine of the notopleuron black ; it is not closely related to known species.

Length 16 mm.

Male.—*Head :* light orange-brown ; face densely, golden-yellow micropubescent, except for a narrow, medial, bare stripe, which does not reach the epistoma ; cheeks bare and shining ; front with pollen of same colour above antenna, but more than upper half of the front with pale, brownish-red or yellow pollen, and the medial fourth bare with a narrow, longitudinal crease ; sublaterally on each side of front, and separated from the eye by a crease, is a longitudinal patch of 7 small bristles of varying strength in 2 rows, the upper elements more stout ; ocellarium polished, light brownish-red, but area between ocelli almost black and without pile or bristles ; behind each upper eye corner and somewhat more medial, a very stout, spike-like bristle present, also 1 or 2 minute black hairs and, behind the bristle, several reddish-yellow, bristly hairs, which mark the uppermost extension of the weak, occipital, bristly pile ; lower pile of occiput also bristly, reddish-yellow and scanty ; proboscis reddish-brown, the sharp apex blackish, the lower surface nearly plane and the upper marked by a very high, conspicuous, arched ridge ; a few hairs present at apex and just beyond the middle a few longer, stiff hairs directed downward from the ventral surface ; palpi of second segment both with slender, black, bristly hairs ; first segment excavated, second with a large, dorso-apical pore ; antenna light brownish-red with outer third of last segment and the short, small, cylindrical, spine-tipped microsegment dark brown ; bristles and bristly pile of antenna black.

Thorax : reddish-sepia and not very dark ; pleuron bare, except for 2 bright, oblique bands of dense, pale yellow micropubescence, 1 extending from flattened, anterior half of humerus down over posterior half of mesopleuron, anterior pteropleuron and posterior half of sternopleuron and middle coxa ; a more whitish band covering whole side of metasternum, posterior coxa and tiny spot on sides of first abdominal segment ; metapleuron with a few, fine, stiff hairs ; halteres red at base, the knob quite a dark red, almost black ; mesonotum with a very dark, sepia, medial stripe bordered on each side by an anteriorly wide stripe of coarse, brownish-yellow pubescence, becoming confluent in front of scutellum ; scutellum bare, thin, more or less flattened with pronounced, transverse, creased ridges and the margin in the middle with a few stout but minute setae ; metanotum laterally golden pollinose ; notopleural spine stout and black ; no other bristles present ; cervix unusually long, the sclerites shining brown, the lateral element with a tuft of scattered, fine, brown, stiffened hairs ; prosternum dissociated.

Legs : shining, light brownish-red ; base of all femora, more extensively on the hind pair, and base of hind tibiae diffusely pale yellow ; pile scanty, appressed, setate and sepia in colour ; all femora somewhat thickened along middle and apex, especially the hind pair

which are chiefly thickened on the outer half, and hind tibia gradually and strongly widened apically, and bearing a rather dense fringe of erect, ventral pile ; bristles of legs short but very stout, black and sharp ; hind femur with 8 lateral bristles, 3 of which are near the apex, a dorsal pair at the apex and 4 medial bristles on the outer half ; posterior femur with 3 lateral, 5 minute, dorsolateral bristles on basal half, 2 dorsomedial on basal fourth which are long, and 1 beyond the middle, as well as 4 long bristles medially on the basal half ; hind basitarsus stout, the next 2 segments also robust but short ; middle femur with 5 posterior bristles, mostly on outer half, 2 anterior bristles, 1 before and 1 after the middle, and a small dorso-apical pair ; anterior femur similar with 1 less posterior bristle ; middle tibia with mostly quite short, spine-like bristles ; 5 anterodorsal, 4 posterodorsal, 8 posteroventral and 3 anteroventral, 2 of which are much longer ; anterior tibia with 9 anterodorsal, 6 posterodorsal, 6 posterior and on the outer half 2 longer, posteroventral bristles ; also with a ventral, apical, long, stout, black spur on a very short protuberance ; basitarsi with black denticles ; claws black, red at the base and sharp ; pulvilli long and light reddish.

Wings : strongly tinged with light reddish-brown, which is a little more reddish or yellowish in subcostal, marginal, first submarginal cells, discal and first 2 basal cells and base of costal cell ; veins light red ; first posterior cell considerably narrowed, marginal cell also somewhat narrowed at the margin ; all other posterior cells and anal cell widely open.

Abdomen : on first 3 tergites wider than mesonotum and these rather strongly flattened over the middle and whole abdomen coarsely but sparsely punctulate with minute, sepia setae ; sides of first tergite with a single, stout, spinous, black bristle and a few, pale hairs ; terminalia and whole abdomen shining, light brownish-red ; epandrium long, gradually widened towards base, nearly plane apically and unmodified ; lamellae comparatively long and hemicylindrical.

Female.—Similar to male.

Holotype ♂, S. W. Australia : Yallingup, 13–23.xii to 14.i (*R. E. Turner* (1914–190)) ; allotype ♀, 7 paratype ♂ and 1 paratype ♀, all with same data. Type and allotype in the British Museum (Natural History) ; paratypes in the collections of this museum and of the author. Named in honour of Dr. M. J. White of Canberra, A. C. T.

Bathypogon chionthrix sp. n.

Small, slender flies, abundantly covered with opaque, white pile, especially dense on the male terminalia. It is this copious, unusual vestiture which at once distinguishes it from known species to which it is not closely related. The two halves of the epandrium are long and lie closely adjacent.

Length 11 mm.

Male.—*Head :* black, face narrowly dark red along eye margins and the whole cheeks; more or less bare, most thinly pollinose over the wide middle portion, which is covered with numerous, long, coarse, shining, bristly, white hairs which extend over entire, gently and barely swollen, slightly convex face ; elevation of face begins a short distance below the antenna ; proboscis black, palpus small and dark reddish-brown and both with bare, white pile ; front, vertex, and occiput greyish-white pollinose, thinly concealing the ground colour ; antenna dark reddish-brown, a little paler on the short, second segment and extreme base of third segment ; third antennal segment comparatively broad over the middle part with short, slender, tapered, blackish microsegment ; pile of occiput abundant and white, changing to a single row of weak, regularly spaced, white bristles at middle of occiput ; behind vertex 3 white bristles, 2 or 3 somewhat more stout, black bristles and

below these bristles some fine, white hairs present; sides of front with a tuft of coarse, bristly white pile; the low ocellarium bears 3 pairs of white, bristly hairs between the ocelli and several others behind; on vertex beside eye, opposite anterior ocellus a single, comparatively long, more stout, black bristle present.

Thorax: pleuron pale brown with a blackish spot above middle coxa, another anteriorly above posterior coxa and a large, disconnected, similar spot on upper mesopleuron; whole mesopleuron blackish, except humerus, supra-alar and postalar region; pleuron thinly dusted with greyish-white pollen; similar, somewhat more dense pollen present on all of mesonotum, except on rubbed areas and on a medial, opaque, black stripe, which is of uniform thickness, beginning on anterior margin and running entire length of mesonotum; bristles quite long and rather stout and black, 3 notopleural, 1 posterior supra-alar, 2 on post callus and 2 pairs on scutellum; halteres sepia brown.

Legs: femora moderately stout and for the most part light ochre-brown; hind femur blackish-brown, except on ventral surface and anterior and middle femora somewhat more dark anteriorly; pile of legs coarse, comparatively long, white and appressed, but pile on ventral surface of all femora and tibiae longer, rather abundant and quite erect; almost all bristles of legs black, numerous, rather stout and particularly well developed on tarsal segments, where they form conspicuous, terminal circlets; hind femur with 3 lateral bristles, a close-set, dorsomedial pair near the apex, hind tibia with 3 dorsolateral, 4 dorsomedial, with frequently shorter elements also, and with 1 ventromedial and 5 ventrolateral bristles; middle femur with 2 anterior bristles, 1 at the middle and 1 beyond, 2 posterior bristles at the apex, its tibia with 2 anterodorsal, 6 posterodorsal, 3 posterior and 2 ventral bristles, as well as 3 anteroventral bristles; anterior femur with 2 adjacent bristles near the apex anteriorly, 1 posterior bristle near the middle, its tibia with 5 anterodorsal, 6 posterodorsal, 2 posterior and 1 posteroventral bristle; tarsal segments dark, reddish-brown; claws slender, sharp, the pulvilli and empodium well developed.

Wings: greyish hyaline.

Abdomen: slender, subcylindrical, tapered; black but rather densely covered with silvery-grey pollen which is even brighter down middles of tergites; pile abundant, copious, opaque white and almost bristly and subappressed; on eighth tergite and hypopygium this white pile even longer, directed backwards and plume-like; sternite similar to tergite; lower surface of terminalia light yellowish-brown, basal part of epandrium yellowish laterally.

Female.—Similar to male; face more extensively light yellowish-brown; thorax with very little coarse, white pile on mesonotum and the white anterior pile replaced by fine, reddish-brown hairs; abdomen also shining, dark reddish-sepia dorsally, the curled-over lateral margins light yellowish-brown, hind femur lacking the dark, dorsal stripe.

The single female has been mounted on the same piece of celluloid as the male, and they may be assumed to belong together, although there is no statement of actual mating.

Holotype ♂, S. W. Australia: Kalamunda, 1–11.iii.1914, 850 feet (*R. E. Turner*); allotype ♀, 14.iii.1914, same data; paratypes 16 ♂, 1–11.iii, 14.iii–14.iv.1914, otherwise same data.

Paratypes in the British Museum (Natural History) and in the collection of the author.

Helolaphyctis nitidus sp. n.

A shining black fly, separable from *Helolaphyctis americanus* Carrera by the presence of some golden pile anteriorly on the mesonotum, some similar pile on the first tergites, and by the presence of long, coarse, characteristic bristles on the terminal abdominal segment.

Length 11 mm.

MALE.—*Head :* black, occiput quite thinly covered with greyish-white pollen, long, dense, white pile below, a broad band of numerous, slender, black bristles beginning at the middle of the occiput, where they are curved a little downward, and continuing over the upper occiput in almost the same density and nowhere stout ; front as well as vertex deeply sunken, scantily grey pollinose, not obscuring the ground colour and with several rows of quite long, fine, black bristles and bristly hairs along each eye margin ; ocellarium with 1 pair of either black or yellow, long, slender bristles and generally with 1 or 2 other pairs of fine, shorter hairs ; face with a moderately conspicuous, convex gibbosity on lower three-fifths, which is densely beset with long, slender, black bristles and a few finer hairs, which are shorter at the lower corners, and with 4 or 5 slender, white hairs opposite the epistoma and eye margin ; surface of face thinly covered on the gibbosity with scanty, greyish-yellow pubescence, becoming much more abundant along eye margins ; upper portion of face medially with 8 or 10 shorter, fine, yellow hairs ; palpus black with a few fine, bristly hairs and with long, fine, white hairs below on first segment ; proboscis black, stout, swollen below at the base, the apex obtuse, subapically creased on dorsal half and with brownish-yellow pile, the base below on basal half with numerous, long, fine, white hairs.

Antenna black with black, comparatively long, bristly pile ; first segment also bears 2 ventral, subapical, quite long, attenuate, black bristles ; apical bristles of second segment longer than the segment ; third segment attenuate on basal third, its length slightly greater than first 2 segments combined ; apex with short, oblique, lip-like microsegment and visible spine.

Thorax : black, dully shining on mesonotum, polished on a middle stripe reaching widely through sternopleuron and into lower half of mesopleuron ; pleuron otherwise rather densely covered with pale, brownish-yellow micropubescence of very fine character ; pile of pleuron moderately abundant, fine and white ; upper border of mesopleuron and upper posterior corner with numerous, long, slender, black, bristly hairs ; metapleuron with a band of numerous, quite long medium stout, pale yellow, longer, appressed setae across anterior margin and on notopleuron ; fairly numerous, additional, long, fine, black, bristly hairs also present, which are more or less erect, undifferentiated, but become longer behind the suture ; scutellum shining black, the margin with 6 or 7 pairs of quite long, yellowish, slender bristles ; disc with appressed, black setate pile.

Legs : shining black, all femora stout, especially the hind pair, which is slightly concave ventrally, strongly convex above ; pile rather loose, blackish on dorsal surfaces but long, fine, pale brownish-yellow on ventral surfaces of femora and tibiae and especially brush-like on hind femur and tibia ; hind femur without true bristles but dorsally bearing several rows of quite long, oblique, yellowish, bristly hairs which include a few black elements and becoming shorter and entirely black at apex ; hind tibia with numerous, weak, black bristles with the dorsolateral row a little more stout basally and containing 6 or 7 elements which are also the longest ; dorsomedial row contains 6–8 bristles, ventrolateral row likewise. Middle tibia with bristles a little more stout, long and quite attenuate, anterodorsal row contains 5 or 6 bristles, posterodorsal row 6–8 quite long, yellow, bristly hairs and this surface with some yellowish-white pile ; 2 or 3 ventral bristles of variable colour also present ; anterior tibia similar ; elements of anterodorsal and posterodorsal rows contain 8 or more in each row, which are somewhat shorter and black ; a posterior and posteroventral, and part of a ventral row with very long, pale yellow, bristly hairs, or weak bristles ; tarsal segments, especially the intermediate, all short ; claws moderately stout, sharp, bent at apex, black, the extreme base brown, the pulvillus large, brown ; empodium long and unusually stout.

Wings : very pale brown, a little darker in costal and subcostal cells ; marginal cell widely open but second vein a little recurrent at apex making a right angle with the costa ; anterior branch of third vein strongly sigmoid ; first posterior cell slightly narrowed, fourth closed with a short stalk ; anal vein closed with a stalk, ambient vein complete.

Abdomen : robust and very slightly tapered ; apex also wide, stout and subcylindrical with large, prominent, ventrally disposed terminalia, partly rotate and widely open below ; shining black, becoming obscurely dark brown laterally on last 3 tergites ; 6 tergites present, the pile dense, appressed, black setate with some appressed, yellow hairs transversely and narrowly along base of first 4 tergites and with moderately abundant, long, fine, yellow hairs along sides of first 5 segments and yellow and black hairs laterally on sixth tergite ; in addition on outer tenth of posterior margin of second and third tergites, outer sixth of fourth and outer fourth of fifth tergite a narrow, linear, yellow, pollinose line ; laterally the very complex surstylus has a cluster of long, attenuate, basally stout, black bristles.

Female.—Similar to male ; hind femur less stout, sides of abdomen more reddish- or orange-brown and with more extensive patches of golden pile, flat appressed on basal margins of first 5 tergites ; seventh and eighth tergites both quite short and, together with the obtuse, downturned terminalia, light, brownish-orange ; post margin of the short eighth tergite bordered with 8 rather close-set, long, slender, black bristles in 1 row and with others over dorsal part of this tergite ; circle hairs brassy yellow.

Holotype ♂, Brazil : Nova Teutonia (*Fritz Plaumann*) ; allotype ♀, 2 paratype ♂ and 2 paratype ♀, all with same data ; collected from 1936 to 1939. Types in the British Museum (Natural History) ; paratypes in the British Museum (Natural History) and the collection of the author.

Acknowledgment

I am indebted to Mr. H. Oldroyd, whom I wish to thank, for the opportunity of studying this interesting material.

NEW SOFT SCALES (HOMOPTERA : COCCOIDEA : COCCIDAE) FROM AFRICA

By G. De Lotto

(*Department of Agriculture, Kenya*)

The holotype of each species described in this paper will be deposited—as usual—in the British Museum (Natural History), London ; one paratype in the U.S. National Collection of Coccidae, Washington, D.C. ; one paratype of *Ctenochiton adspersus* and *amoenus* in the South African National Collection of Insects, Pretoria. The remainder are in the collection of the Department of Agriculture, Nairobi, Kenya.

Akermes nitidulus sp. n. (Fig. 1)

Body oval, moderately convex ; dorsally marked by a series of small depressions along marginal and submedian areas as shown in figure ; colour very dark brown, almost black. Mounted specimens up to 4 mm. in length. Dorsum membranous in very young adults. Chitinisation of dermis not uniform, beginning from area around anal plates, extending progressively forwards to form a series of marginal and submedian chitinised patches which correspond to the depressed areas visible in living adults. Very numerous small spherical, strongly chitinised glands having a central duct are distributed all over dorsal dermis, forming an irregular reticulated pattern. Several other glands, much larger in diameter, hemispherical in shape and apparently without any duct, crowded on marginal and submarginal areas and in front of anal plates. Dorsal setae swollen near base so as to appear arrow-shaped ; fairly numerous and evenly scattered. Submarginal tubercles 6–11 on either side. Anal plates about as long as their combined width, with a subapical and 2 or 3 small apical setae. Stigmatic cleft obsolete, provided with a single very small finger-like spine. Setae of marginal fringe somewhat shorter than stigmatic spine, spiniform, set rather apart from one another. Ventral dermis without any multilocular disc pores or tubular ducts. Quinquelocular pores associated with stigmatic openings set in a band 2 or 3 pores wide. Antennae with 6 segments, the third being the longest. Legs all much reduced in size, without articulatory sclerosis between tarsus and tibia ; ungual digitules of different shape, one being knobbed at apex, opposite one spiniform ; tarsal ones slightly knobbed apically as usual.

Holotype ♀ and 9 ♀ paratypes, Kenya : Nairobi, 18.viii.1954, on branches of *Annona chrysophylla* Boj. (*G. De Lotto*) coll. No. 1664.

This species differs from the congeneric *andersoni* Newstead, 1917, and *colae* Green and Laing, 1924, already known from the Ethiopian region, by the total absence in *nitidulus* of dorsal cribriform plates.

Ctenochiton adspersus sp. n. (Fig. 2)

Adult females moderately convex ; dorsum covered by a layer of transparent granulose wax ; colour uniformly dark brown. Mounted specimens broadly oval, up to 4·5 mm. long. Dorsal dermis at full maturity fairly strongly chitinised. Dorsum punctured in young adults, in which process of chitinisation has not set in, by very abundant subspherical, strongly chitinised glands, having a central duct and forming an irregular reticulated pattern. Tubercle-like pores hemispherical, set in an irregular linear group of 20–30 in

front of anal plates. Submarginal tubercles 5–10 on each side. Dorsal setae stoutly conical, not very numerous. Anal plates distinctly longer than their combined width, acutely pointed at posterior end and provided with a discal fimbriate seta and 2 small spiniform apical ones. Stigmatic spines 3, median about 3 times as long as laterals. Setae of marginal fringe of 2 sizes, both slender and frayed at apex, set fairly close to one another. Ventral dermis with very numerous multilocular disc pores about genital opening and extending in loose transverse rows as far as prothorax. Quinquelocular pores also numerous

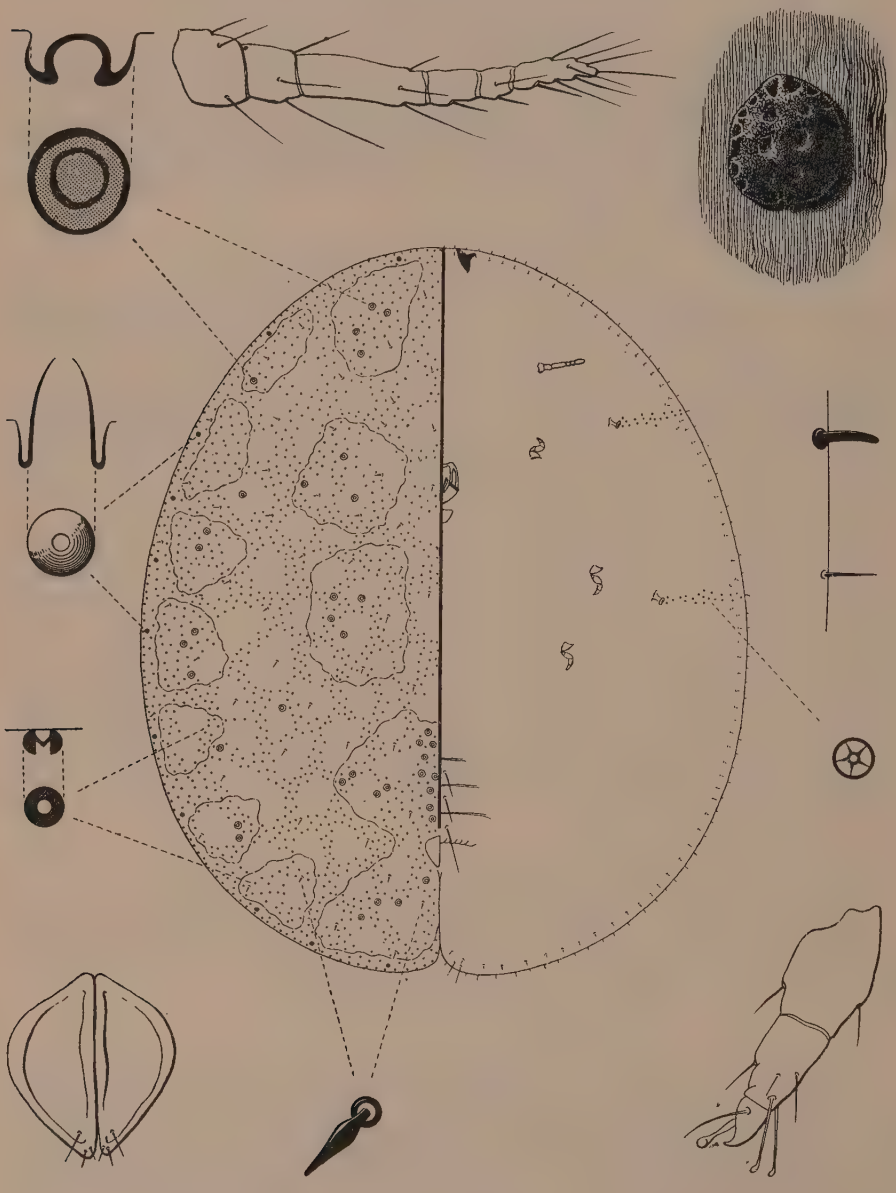


FIG. 1.—*Akermes nitidulus* sp. n.

and arranged in a band 4 or 5 pores wide. Tubular ducts abundant on prosoma in front of mouthparts and anterior stigmas ; caudad to anterior stigmas a few more ducts scattered on marginal and submarginal areas as far as posterior end. Antennae 8-segmented, at times with a pseudoarticulation on fifth segment. Legs normal with an articulatory sclerosis between tarsus and tibia.

Holotype ♀ and 7 ♀ paratypes, South Africa : Nelspruit, 15.x.1954, on *Trichilia roka* (Forsk.) Chiov. (*E. C. G. Bedford*) coll. No. 2166.

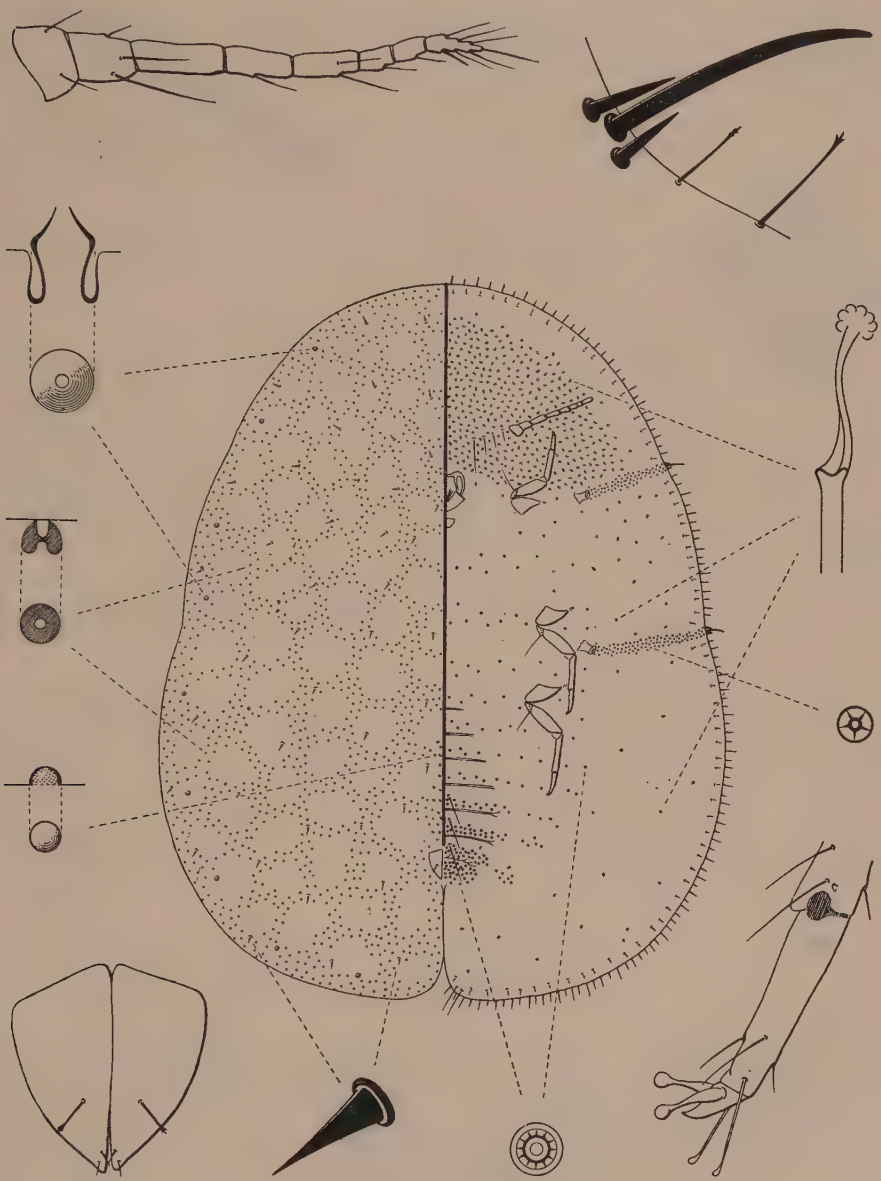


Fig. 2.—*Ctenochiton adspersus* sp. n.

Ctenochiton amoenus sp. n. (Fig. 3)

No living adults or dried preserved material of this species were seen. The whole collection consisted of a few young specimens stored in alcohol.

Flattish and covered by a layer of granulose translucent wax. Mounted specimens up to 3 mm. in length. Dorsal dermis with very abundant small spherical glands having a minute central duct, forming on median and submedian areas an irregularly reticulated

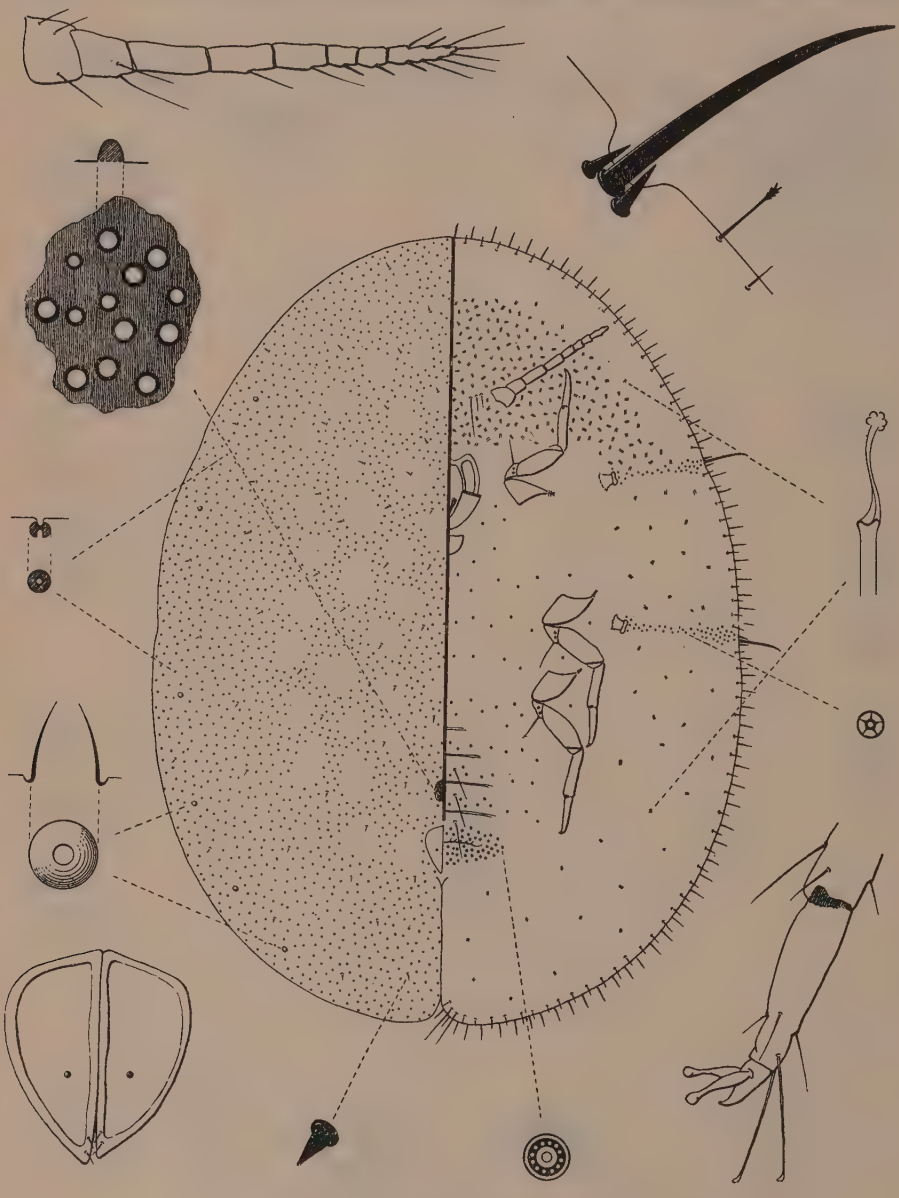


FIG. 3.—*Ctenochiton amoenus* sp. n.

pattern. Dorsal setae stoutly conical, evenly distributed. Tubercle-like pores very strongly convex, of varying diameter set in one group of 13–20 enclosed within a slightly chitinised area in front of anal plates. (In 1 specimen a supplementary group of 4 pores was present.) Submarginal tubercles 4–6 on either side. Anal plates together slightly longer than wide, with 2 or 3 small apical setae. In all specimens examined discal area provided with a seta socket, the setae, however, all broken away. Stigmatic spines 3, median one very long, being about 5–6 times as long as laterals. Setae of marginal fringe of varying length, longer ones slender and frayed at apex ; shorter ones normally setulose or only very slightly frayed apically. Ventral dermis with numerous multilocular disc pores besetting genital opening and extending in segmental rows as far as prothorax. Quinquelocular pores associated with stigmatic openings not very numerous and arranged in a band 2 or 3 pores wide. Tubular ducts numerous on prosomatic area in front of mouthparts and a few extending to marginal and submarginal areas of meso- and postsoma. Antennae 8-segmented, except in 1 specimen in which 1 antenna was reduced to 7 segments. Legs all well developed, having an articulatory sclerosis between tarsus and tibia.

Holotype ♀ and 6 ♀ paratypes, Southern Rhodesia : Melsetter, 20.i.1958, on branches of *Coffea arabica* L. (*A. R. Melville*) coll. No. 2279.

Ctenochiton arborescens Laing. (Fig. 4)

Ctenochiton arborescens Laing, 1928, *Entomologist* **61** : 215 [*nomen nudum*].
Ctenochiton arborescens Laing, 1929, *Ann. Mag. nat. Hist.* (10) **4** : 478, fig. 11.

This species was originally described by Laing on specimens—mostly attacking coffee—from various parts of the African continent south of the Sahara, namely from San Thomé on *Tabernaemontana* sp., Gold Coast on stenophylla coffee [*Coffea stenophylla* G. Don], Kenya on an unidentified plant, Tanganyika on *Coffea arabica* L., Uganda on *Coffea robusta* Lind. and unidentified plant, and Sudan on coffee [*Coffea* sp.]. One of the specimens collected on an unidentified plant in Kenya is at hand and was used, together with material collected more recently, for the following redescription.

" Adult female subcircular or subtriangular, moderately convex above ; length approximately equal to greatest breadth ; surface dull (as if coated with fungus), except for a short medio-longitudinal and two transverse ridges which are smooth and shining, of a paler tint, and sometimes demarked by a thin covering of translucent glassy secretion. Margin with a close series of prominent, dull glassy, flattened, triangular processes which are equal to from one-quarter to one-third the length of the anal cleft ; each process supported by six or more of the marginal setae. Under surface moderately concave. Average diameter 2·5 mm." (Laing, *loc. cit.*). Adults at full maturity uniformly strongly chitinised.

The following description of body structures was made on individuals in which the process of chitinisation had not set in.

Dorsal dermis with numerous small spherical glands provided with a central duct, evenly distributed, and not forming any reticulated pattern. Dorsal setae rather stoutly conical, not numerous. Tubercle-like pores absent. Submarginal tubercles from 5–8 on each side. Anal plates together about as long as wide with outer angle and posterior end acutely pointed, and having a very robust frayed discal seta and 2 or 3 small apical ones. Stigmatic spines 3, median about 3 times as long as laterals. Setae of marginal fringe of 2 different sizes, both robust, prominent and deeply branched, set very close

together. Ventral dermis with rather few multilocular disc pores around genital opening, extending in loose transverse rows as far as meta- or prothorax. Quinquelocular pores few and set in a band 1 pore wide. Tubular ducts not very abundant and crowded on prosoma in front of mouthparts, a few scattered along marginal and submarginal areas of meso- and postsoma Legs all well developed, having an articulatory sclerosis between tarsus and tibia. Antennae 8-segmented. According to Laing specimens with 7-segmented antennae, through fusion of fourth and fifth segments, were also observed.

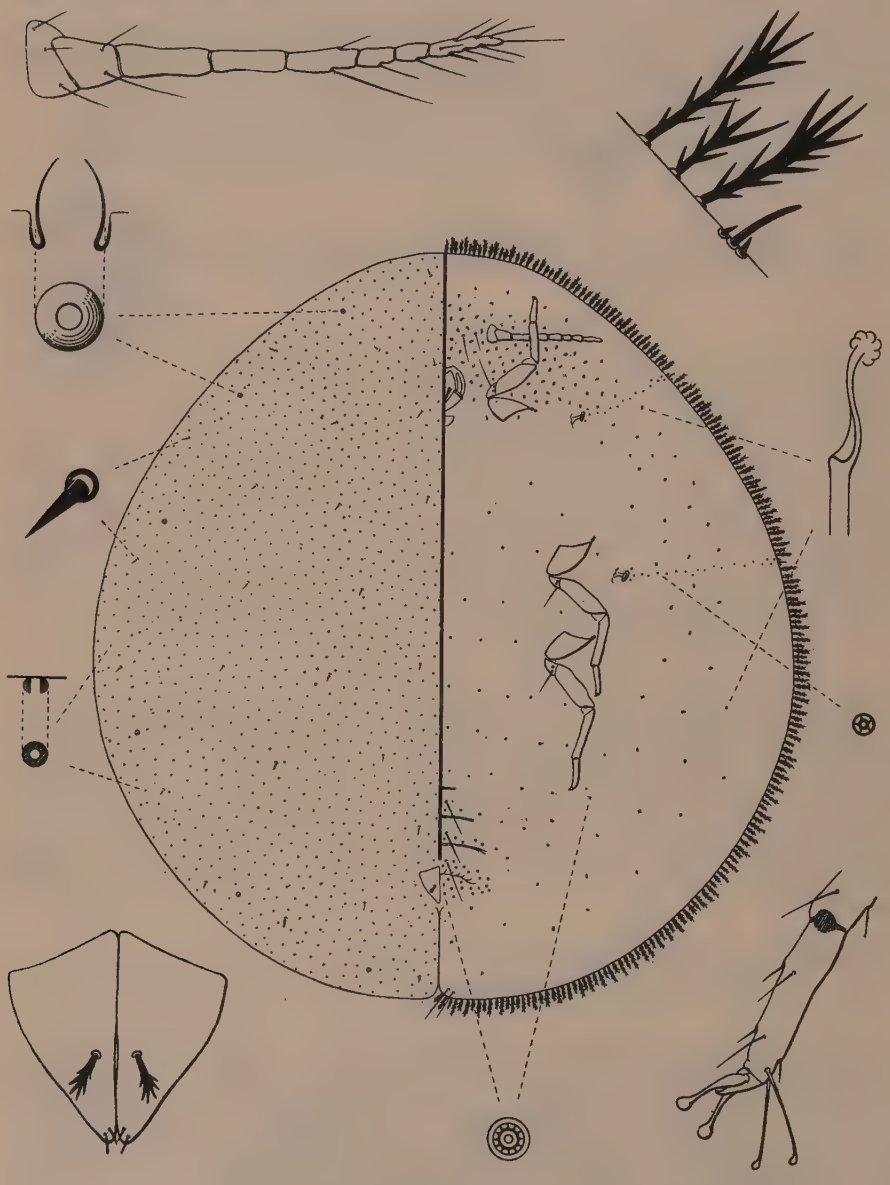


Fig. 4.—*Ctenochiton arborescens* Laing.

KENYA : on an unidentified plant (*H. Wilkinson*) ; Kitale, January, 1952, on *Coffea arabica* L. (*D. J. McCrae*).

Ctenochiton castaneus sp. n. (Fig. 5)

Adult females flat, covered by a thin layer of granulose transparent wax ; colour uniformly brown. Mounted specimens very broadly oval, up to 3 mm. long. Dorsal dermis of all specimens studied membranous, with numerous small highly chitinised spherical

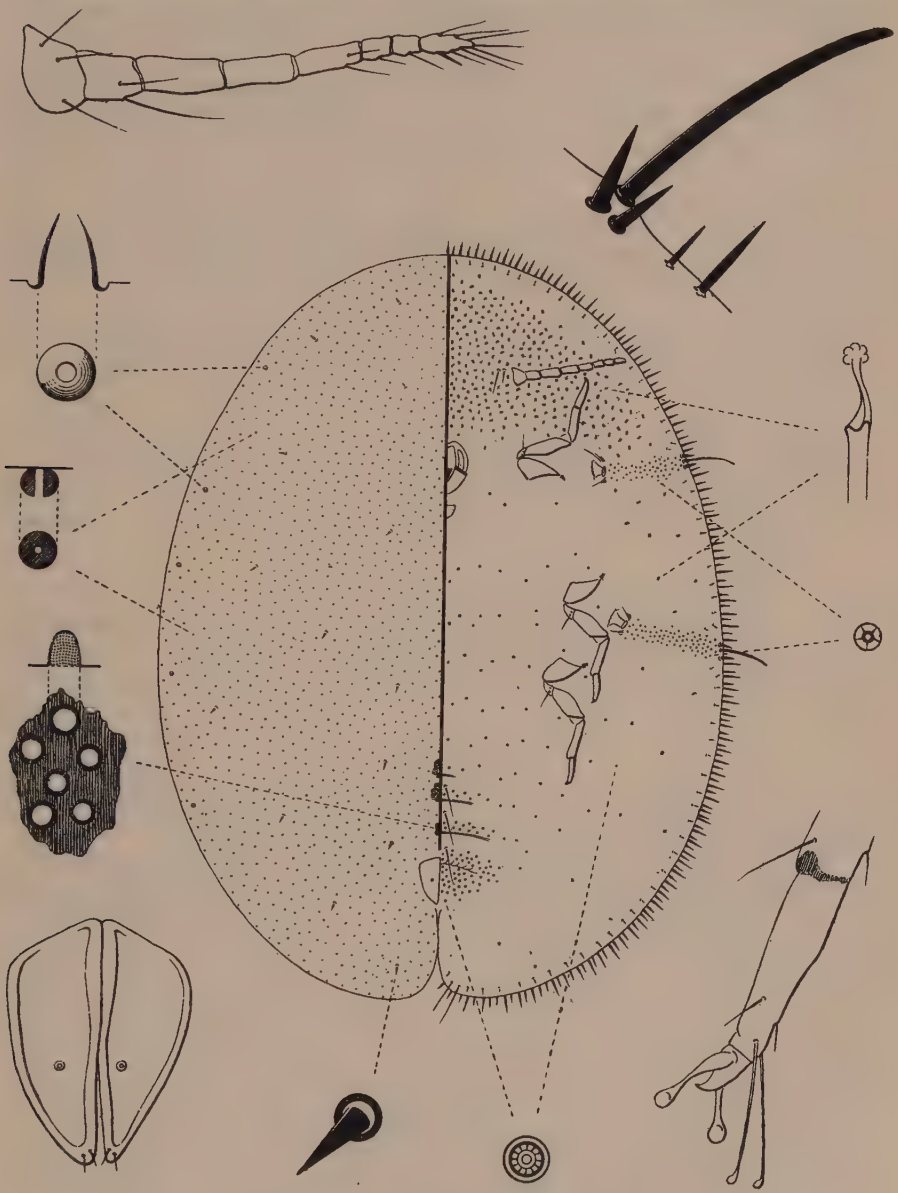


FIG. 5.—*Ctenochiton castaneus* sp. n.

glands, evenly distributed. Tubercle-like pores dome-shaped, set in 3–5 groups along median line in front of anal plates ; each group formed by 1–8 pores, beset by a small chitinised area. Dorsal setae stoutly conical, few. Anal plates together distinctly longer than wide, with posterior lateral margin broadly rounded ; discal area with a socket indicating the presence in living adults of a discal seta, which was broken away in all specimens available ; distal end of each plate with 2 small apical setae ; on either side the plates in part covered by dorsal dermis. Submarginal tubercles 3–7 on either side. Setae of marginal fringe of 2 sizes, closely set, all very stout, spiniform. Stigmatic spines 3, of which median about 3–4 times as long as laterals. Ventral dermis with numerous multilocular disc pores about genital opening and arranged in irregular transverse rows as far as prothorax. Quinquelocular pores very numerous and set in a band 4 or 5 pores wide. Tubular ducts crowded on head and a few scattered on median and submedian areas of thorax and abdomen. Legs well developed with an articulatory sclerosis between tarsus and tibia. Antennae 8-segmented, except in 1 specimen in which 1 was of 6 segments only.

Holotype ♀ and 5 ♀ paratypes, KENYA : Thika, 16.ix.1953, on leaves of *Pistacia aethiopica* Lencz (*R. M. Nattrass*) coll. No. 1463 ; one ♀ paratype, Nairobi, 10.i.1955, on leaf of *Acokanthera schimperi* (D.C.) Benth. (*G. De Lotto*) coll. No. 1821.

The three species of *Ctenochiton* described above as new, together with *C. arborescens*, represent a small group of very closely related forms. They can be separated by the following key :

A Tubercle-like pores in front of anal plates set in 1–5 small groups enclosed within a chitinised area :
  B Setae of marginal fringe stoutly spiniform . . . . . **castaneus**
  BB Setae of marginal fringe slender and frayed apically . . **amoenus**
AA Tubercle-like pores absent or, if present, never enclosed within a chitinised area :
  C Tubercle-like pores absent ; setae of marginal fringe very prominent and strongly branched . . . . . **arborescens**
  CC Tubercle-like pores scattered in front of anal plates ; setae of marginal fringe slender and only slightly frayed at apex **adspersus**

REFERENCES

GREEN, E. E. and LAING, F., 1924, Descriptions of some apparently new non-Diaspidine Coccidae. *Bull. ent. Res.* **14** : 415–9.

LAING, F., 1928, A List of the Coccidae of San Thomé. *Entomologist* **61** : 214–5.

—— 1929, Descriptions of new, and some notes on old, species of Coccidae. *Ann. Mag. nat. Hist.* (10) **4** : 465–501.

NEWSTEAD, R., 1917, Observations on Scale-Insects (Coccidae). *Bull. ent. Res.* **7** : 347–380.

A NOTE ON *OVATICOCCUS AGAVIUM* (DOUGLAS) (HOMOPTERA: COCCOIDEA: ERIOCOCCIDAE) AND ON THE GENUS *OVATICOCCUS* GENERALLY

By K. Boratyński

Specimens of *Ovaticoccus agavium* (Douglas, 1888) were recently obtained from the hothouses of the Royal Botanic Gardens at Kew and identified by comparison with the specimens from the type material preserved in the British Museum (Natural History). It appears that the existing descriptions of the species are somewhat inaccurate and incomplete, leaving room for doubt as to the exact identity of the specimens; moreover, the modern descriptions are based on material other than the type. The opportunity is therefore taken to illustrate and describe in detail the species on the basis of the type material supplemented by the other specimens at hand. The present record of *O. agavium* at Kew Gardens is the first since its original discovery there in 1888.

I wish to acknowledge with thanks the permission of the Curator of the Royal Botanic Gardens to collect the specimens there; and of the Trustees of the British Museum (Natural History) and the Director of the Commonwealth Institute of Entomology to examine the specimens in their respective collections.

Ovaticoccus Kloet, 1944

A few words seem to be necessary regarding the genus and the generic name. Describing *Coccus agavium* sp. n. in 1888, Douglas remarked as follows: "At one time I thought it might constitute the type of a new genus, under the name of *Gymnococcus*, but in consideration of the important and leading characters of the antennae I have concluded (for the present at least) that it is better to regard all the other characters as specific, and to refer the species to Signoret's genus *Coccus*." (*Ent. mon. Mag.* **25**: 150–1.) Subsequently it has been recognised that *agavium* represents a distinct genus, and, although by modern standards of zoological nomenclature Douglas's remark has no formal validity, the name *Gymnococcus* and Douglas's responsibility for it was generally accepted and used. In 1896 Cockerell, in his *Checklist of the Coccidae*, listed on p. 323 the genus "*Gymnococcus*, Dougl." with a single species "63. *agavium* Dougl." and later (1899) included the genus in *Tables for determination of the genera of Coccidae*. In 1897 Newstead described some additional important characters of the species, referring to it as *Coccus* (*Gymnococcus*) *agavium* Douglas, thus apparently indicating a subgeneric status for *Gymnococcus*, though he suggested that the species should be included in the genus *Ripersia* Signoret; later (1903), however, he recognised the genus *Gymnococcus* Douglas. Except Parrott (1900), who ascribed the authority for the name *Gymnococcus* to Newstead, all the other authors, *i.e.* Fernald (1903), Leonardi (1911), Lawson (1918), MacGillivray (1921), Borkhsenius (1949, 1950), and Ferris (1955),

referred to it as *Gymnococcus* Douglas.[1] Ferris (*l.c.* : 178–9) discussed the generic name for *agavium* and other species at present included in the genus, and after rejecting the two other names involved, i.e. *Fonscolombia* Lichtenstein and *Pseudochermes* Nitsche as of doubtful identity, adopted " the genus *Gymnococcus* Douglas the type of which was adequately described ".

The fact that the name *Gymnococcus* Douglas, 1888 was preoccupied by *Gymnococcus* Zopf, 1887 (Mycetozoa, Protozoa) had, however, been overlooked, although this was already noticed by Kloet, who in 1944 (*Ent. mon. Mag.* **80** : 86) formally introduced a new generic name *Ovaticoccus* for *Gymnococcus agavium* Douglas. Professor Ferris's attention was drawn to this and in his recent paper (Ferris, 1957) *Ovaticoccus* Kloet was substituted for the preoccupied *Gymnococcus* Douglas.

The composition of the genus is at present somewhat provisional. Ferris (1955) thus included in it the seven North American species originally referred either to *Gymnococcus* or to *Fonscolombia* ; two other species, one from Argentina and one from Spain, were referred to *Gymnococcus* in original descriptions. The species involved are :

1. *Coccus agavium* Douglas, 1888—Britain, France, Eritrea, U.S.A., U.S.S.R.
2. *Gymnococcus adoxus* Ferris, 1955—U.S.A. (Texas).
3. *Gymnococcus* (*Parrottia*) *agenjoi* Gomez-Menor Ortega, 1954—Spain.
4. *Fonscolombia braggi* Cockerell and Robinson, 1915—U.S.A. (Colorado).
5. *Gymnococcus lahillei* Leonardi, 1911—Argentina.
6. *Gymnococcus nativus* Parrott, 1900—U.S.A. (Kansas).
7. *Fonscolombia peninsularis* Ferris, 1921—U.S.A. (New Mexico).
8. *Gymnococcus ruber* Parrott and Cockerell, 1899—U.S.A. (New Mexico).
9. *Fonscolombia yuccae* Ferris, 1919—U.S.A. (New Mexico, Texas).

Dr. D. J. Williams, of the Commonwealth Institute of Entomology, kindly drew my attention to mounted specimens of *Pseudantonia agaves* Chiaromonte, 1929, which after examination proved to be identical with *C. agavium* Douglas. These specimens, in the Collection of the British Museum (Natural History) (Green's Collection, B.M. 1940, 180), no doubt represent a part of Chiaromonte's original materal submitted to Green for identification (Chiaromonte, 1929 : 22), and agree very well with the original description. Thus *Pseudantonia agaves* Chiaromonte, 1929, becomes a junior synonym of *Coccus agavium* Douglas, 1888.

Apart from *O. agavium*, of which samples from several localities were examined, only one other species, *G. ruber*, represented by a slide with some (!) type material (British Museum (Natural History) Collection), was available for examination ; unfortunately this preparation is in such an unsatisfactory condition that only a few details can be seen. The nine species listed above appear, however, to form a somewhat heterogeneous group, and, as Ferris (1955 : 179) remarked, further studies and information are needed for their definite disposition. The heterogeneous character of the group is also reflected in the fact that Gomez-Menor Ortega suggested a new subgenus *Parrottia*

[1] In S. A. Neave, 1939, *Nomenclator Zoologicus* **2** : 529 there is the following entry : " *Gymnococcus* Douglas 1888, *Ent. mon. Mag.* **25** : 151.—Hem."
" *Gymnococcus* Cockerell (*non* Douglas, 1888) 1896, *Bull. Illinois Laborat.* **4** : 323.—Hem." which is to indicate that " Cockerell in the *Bull. Illinois Laborat.* **4** is the first reference to *Gymnococcus agavium* ". (*In litt.*, G. B. Stratton, Librarian and Clerk of Publications, Zool. Soc. Lond., 18.ix.1957).

for his species *agenjoi*. It should be noted, however, that the name *Parrottia* is preoccupied by *Parrottia* MacGillivray (1921 : 394 and 458) for *Aspidiotus moorei* Green.

Generic Diagnosis

The provisional composition of the genus makes the problem of generic diagnosis a difficult one. The earlier descriptions (Parrott, 1900; Newstead, 1903) are inadequate by modern standards. Borkhsenius (1950) defined the genus in some detail on the basis of specimens of *agavium* from Russia, and Ferris (1955) gave a separate diagnosis based on American specimens of the type species and then enlarged it " to permit the inclusion of the other species here assigned " (*l.c.* : 178); this procedure would appear to be the only one appropriate at present. Detailed study of various specimens of *O. agavium*, including the type material, showed that the existing diagnoses of the genus as based on the type species are somewhat incomplete. In particular the following characters have been overlooked : the presence of the tubular ducts characteristic of the family, the presence of the tooth on the claw, and the presence of characteristic oval monolocular pores on the ventral side of the abdomen. Consequently the diagnosis should be amended as follows :

Referable to the family Eriococcidae as defined by Ferris (1957 : 82–83). *Adult female* with well developed legs and antennae, the latter 7-segmented ; claw of the legs with tooth. Anal opening more or less displaced to ventral side of body, with well developed subanal plate ; anal ring without pores, small, thin and incomplete, divided longitudinally into 2 slender crescent-shaped pieces, each with 3 small setae. Anal lobes obsolete, indicated by a group of setae. Body throughout with small unmodified setae ; dorsally also with enlarged, short, somewhat acorn-shaped spines. Tubular ducts and quinquelocular pores present ; ventral side, especially of the abdomen, with small oval monolocular pores arranged in bands and groups. Both spiracles with a group of quinquelocular pores near the opening.

First instar nymph with 6-segmented antennae, the unmodified setae and dorsal acorn-shaped spines present, and with a few quinquelocular and oval pores ; *second instar* nymph similar to the first, with 6-segmented antennae and with more setae, dorsal spines, quinquelocular and oval pores ; *third instar male* nymph with 7-segmented antennae and with considerably more tubular ducts, but with the acorn-shaped spines normally entirely absent.

At oviposition the female enclosed in copious but poorly defined and loosely felted mass of waxy secretion. Male puparia small, oval, closely felted and well defined.

The genus, as defined above, appears to be nearest to *Onceropyga* Ferris and *Eriococcus* Signoret, but is well characterised by the condition of the anal lobes and of the anal ring, and by the presence of the ventral oval derm pores and of the dorsal acorn-shaped short spines.

Ovaticoccus agavium (Douglas, 1888)

Coccus agaviam Douglas, 1888.
Gymnococcus agavium Douglas : Cockerell (1896) ; Parrott (1900) ; Newstead (1903) ; Fernald (1903) ; Vayssière (1914) ; MacGillivray (1921) ; Borkhsenius (1949, 1950) ; Ferris (1955).
Coccus (*Gymnococcus*) *agavium* Douglas : Newstead (1897).
Ovaticoccus agavium (Douglas) : Kloet (1944) ; Ferris (1957).
Pseudantonina agaves Chiaromonte, 1929, **syn. n.**

Distribution and records.—Described by Douglas in 1888 from specimens found on *Agave* sp. in the Royal Botanic Gardens, Kew, imported three years

previously from one of the Southern States of North America ; information given by Newstead and Parrott refers to the same specimens, and the references by Cockerell, Fernald, MacGillivray and Kloet are purely nominal to the species. Vayssière recorded it on *Agave* sp. from France (La Mortola, près de Vintimille, Coll. A. Vuillett) ; Chiaromonte (as *Pseudantonina agaves* sp. n.) on *Agave sisalana* Perrine from East Africa (Eritrea) ; Borkhsenius on *Agave* and *Dracaena* from U.S.S.R. in hothouses of Leningrad (Russia), Odessa (Ukraine) and Chernovtse (Bukovina) ; and Ferris from U.S.A. : on *Agave* sp. in the New York Botanical Gardens ; *Agave lecheguilla* Torr. at Mt. Franklin, El Paso, Texas ; *Agave* sp. at Peach Spring, Arizona ; and *Agave nevadensis* (Engelm. ex Greenm. and Roush) Hester from Ivanpah Mountains, Nevada.

Material examined.—The following were available for the present study : Specimens of the type material preserved in the British Museum (Natural History), supplemented by specimens collected at Kew in 1956 and 1957 on *Agave* sp., *A. scheuermanni* Trelease, *A. decipiens* Baker, *A. parryi* Engelm., *A. lecheguilla* Torr. Also mounted specimens in the British Museum (Natural History) from : France on *Agave* sp., ex coll. Vayssière, and on *Agave* sp. from Antibes (A.M.), 8.viii.1929 (*A. Balachowsky*) ; East Africa (Eritrea) labelled *Pseudantonina agaves* Chiaromonte, on *Agave sisalana*, xii.1926 (*Paoli*).

Adult female.—Shape and *size* of body varies according to age. Immediately after first moult young adult female elongated, almost parallel-sided, with both ends rounded, and segmentation of body distinct ; when mounted, about 1155 μ long and 450 μ wide, with anal opening ventral but near posterior apex, and the setae marking the anal lobes marginal. During following growing period size gradually increases because of considerable expansion especially of dorsal derm, the fully grown ovipositing female becoming globular, with segmentation of body obscure ; when mounted (fig. 1*A*) broadly oval, up to 2250 μ long and 1680 μ wide, with anal opening and anal lobe setae ventral, at some distance from margin. Old individuals relatively much broader than young ones, but the increase in both dimensions, although not the same, quite regular ; relation between length (x) and width (y) of mounted specimens well expressed by the regression line formula (x and y in μ) : $y = 1{\cdot}18\,x - 58$. *Derm* membranous throughout, dense and rugose in young individuals, thin and transparent in old *Antennae* (fig. 1*B*) 7-segmented, inserted near median line at anterior end of body, short, 178–199 μ long (average 189), tapering gradually from about 29 μ wide at level of second segment, to 17·5 μ at apex. Length of segments 1 to 7 in μ (averages in brackets) : 31·5–38·5 (35·1) ; 28·0–31·5 (28·8) ; 28·0–35·0 (29·9) ; 21·0–28·0 (24·1) ; 21·0–24·5 (21·3) ; 17·5–24·5 (21·0) ; 28·0–31·5 (29·2) ; first segment about 48 μ wide at base, second, fourth, fifth and sixth almost quadrate, and third and fifth longer than wide. Distribution of setae shown on figure (1*B*) ; presence of one stout finger-like seta on fifth segment, sixth and seventh segments each with one of the setae thicker than the others, and third with no setae at all, appear to be characteristic. *Eyes* small, simple, about 26 μ in diameter, situated laterally, at some distance from base of antennae. *Rostrum* short and wide, apparently 3-segmented. *Legs* small, short and stout anterior (fig. 1*C*) somewhat shorter and stouter than posterior (fig. 1*D*) ; total length of legs in μ : anterior 262–287 (average 274·5) ; middle 269–301 (280·8) ; posterior 283–311 (296·0). Segments of legs well developed : *coxa* of usual subtriangular shape, hinged laterally to the small but distinct forked rudiment of coxal process (?) of pleuron ; coxa of hind legs with a few irregular transparent loculi ; *trochanter* triangular with 2 oval sensoria on each side at base, and 2 setae, one long and one short, at apex ; *femur* broad, about 81 μ long in anterior and middle legs and 84 μ long in posterior legs, well sclerotised dorsally but membranous ventrally ; *tibia* somewhat imperfectly sclerotised distally,

broader and shorter than *tarsus* which is slender, tapering distally and with 2 apically enlarged tarsal digitules; average length of tibia + tarsus of anterior, middle and posterior legs in μ: 53·7 + 61·6; 55·4 + 60·0; 57·2 + 69·4, respectively. *Claw* about 20 μ long, slender, with small but distinct tooth near apex, and with 2, about 30 μ long, apically

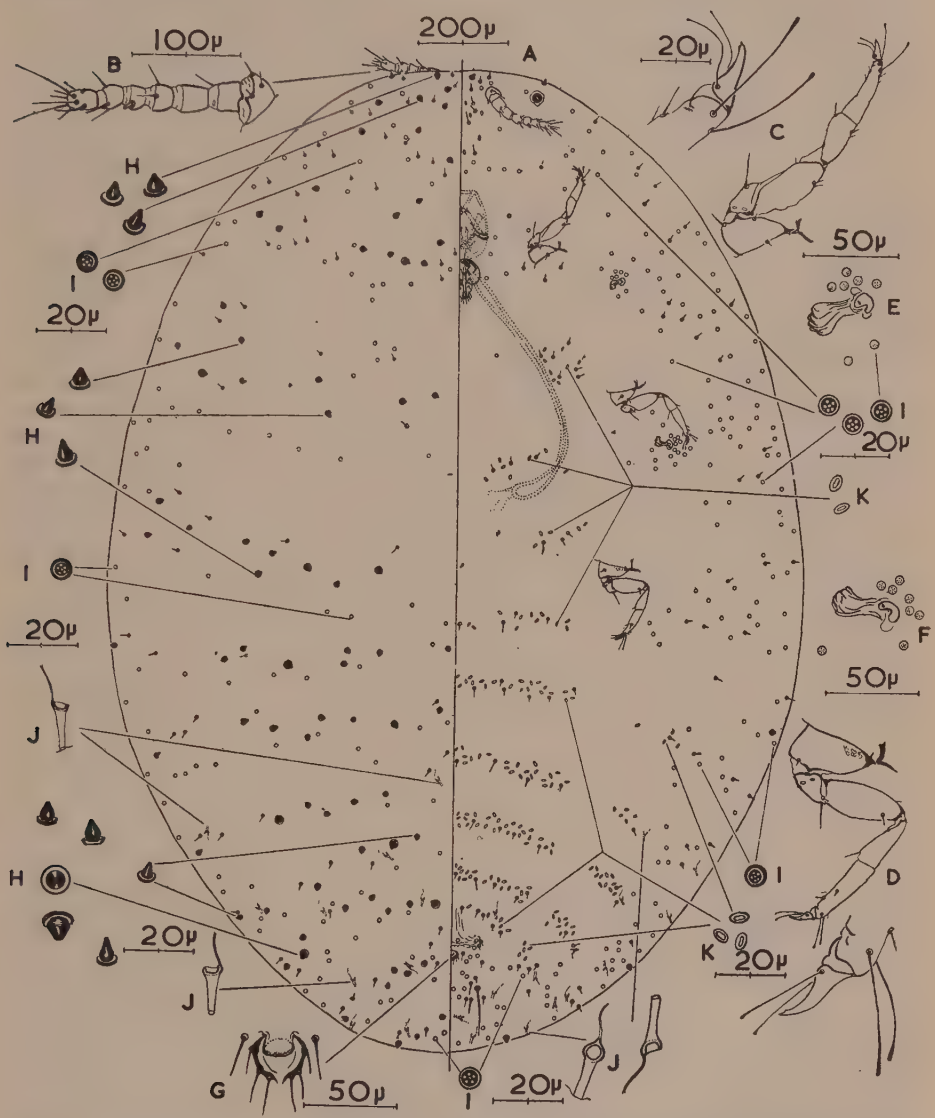


FIG. 1.—*Ovaticoccus agavium* (Douglas) on *Agave* sp. from Royal Botanic Gardens, Kew. (*A*) Adult female; (*B*) antenna; (*C*) and (*D*) anterior and posterior legs respectively; (*E*) and (*F*) anterior and posterior spiracles respectively; (*G*) anal ring; (*H*) dorsal spines; (*I*) quinquelocular pores; (*J*) tubular ducts; (*K*) oval pores. The scale lines marked 20μ refer to figs. *H*, *I*, *J*, *K*, and to detail of the claw in figs. *C* and *D*; those marked 50μ to figs. *E*, *F*, *G*, and to the whole legs in figs. *C* and *D*; 100μ to fig. *B*; and 200μ to fig. *A*.

enlarged digitules. Both *spiracles* (fig. 1*E*, *F*) with a wide and short bar supporting a small opening and with a group of several quinquelocular derm pores in front of spiracular opening. *Anal opening* (fig. 1*G*) ventral, more or less removed from posterior apex, small, with the subanal plate well developed and overlapping about one-third to one-half of anal opening. *Anal ring*, small, thin and without pores, incomplete, composed of 2 separate lateral crescent-shaped pieces, each with 3 very fine, 15–24 μ long setae ; laterally, near anterior end of each piece, one stouter, 21–27 μ long, para-anal seta. *Vulvar opening* transverse, not well defined, situated immediately in front of anal opening. *Anal lobes* indicated by a group of 4 setae : one large, 112–129·5 μ long, and 3 smaller, 17·5–31·5, 24·5–42·0, 35·0–52·5 μ long, respectively. *Derm vestiture* composed of short enlarged spines, unmodified setae, quinquelocular pores, tubular ducts, and oval monolocular pores. *Spines* (fig. 1*H*) narrowed at base, enlarged in the middle and rapidly tapering apically, with apex obtuse ; each inserted within a well developed basal ring, or collar. Size of spines varies considerably : length from 4·5 to 9·0 μ ; width from 3·0 to 7·5 μ ; diameter of collar from 4·5 to 10·5 μ. Distributed on dorsum in a pattern composed of : a scattered group on the head, 3 transverse bands on thorax and 7 transverse irregular rows on abdomen (segments 1–7) ; the bands and rows occupying middle of segments. Posterior abdominal rows composed of comparatively few spines, the number increasing in anterior rows and bands, but actual number present varying considerably in different individuals ; *e.g.* in last abdominal row from 5 to 9, in first from 9 to 19, and in mesothoracic band from 13 to 23 ; consequently total number of spines shows a considerzble range of individual variation, from 120 to 182. Actual number of spines in different rows and in different individuals appears to be inversely correlated with size of spines ; thus the posterior rows are composed of fewer but larger spines, while the anterior bands are composed of numerous but smaller ones ; and in individuals with a low total number large and conspicuous spines predominate, while in those with a high number they are smaller and less conspicuous. *Unmodified setae* distributed throughout body in usual segmental rows and groups ; setae on dorsum and margins small, 7·5–15·0 μ long, but on venter of variable size, some reaching 45·0 μ. Quinquelocular pores (fig. 1*I*), about 5 μ in diameter, scattered and numerous on whole marginal area of body including head and posterior end of abdomen, and on dorsum in transverse rows composed of a few widely separated pores occupying posterior part of tergites. Single quinquelocular pores occur also on ventral side of thorax and occasionally on anterior abdominal sternites. Tubular ducts (fig. 1*J*) 13·0–15·0 μ long, with inner cup 3·0–3·5 μ deep and 6·0 μ in diameter ; distributed in very variable numbers on abdomen, forming there transverse median dorsal rows occupying anterior part of fourth to eighth abdominal tergites, and irregularly scattered on marginal area of first to eighth abdominal segments ; very occasionally single ducts present on tergites of anterior abdominal segments and on thorax. On fifth, sixth, seventh and eighth segment, ducts numerous, 8–15, 8–16, 7–15 and 4–7, respectively, and the dorsal rows more or less complete ; dorsal row on fourth segment often incomplete, and marginal ducts on first and second abdominal segment often entirely absent. Total number of ducts varies individually from 35 to 73. *Oval monolocular derm pores* (apparently not previously observed) : oval, about 6 μ by 4 μ, with poorly defined rim and centre elongated, somewhat constricted in middle (fig. 1*K*) ; confined to ventral side of body and arranged on abdomen in median transverse bands on first to sixth segments, and submarginal groups on second to sixth, and on thorax in anteromedian groups at base of middle and posterior legs, and a group near median line at level of second spiracles. Here again number of pores varies considerably ; thus, median abdominal bands on first, second, third, fourth, fifth and sixth segments composed of 4–20, 13–28, 18–41, 9–31 and 0–8 pores, respectively ; submarginal groups on second, third, fourth, fifth and sixth segments of 0–2, 0–8, 2–16, and 0–5 pores, respectively ; number in the 3 thoracic groups varies from 1–10 pores. Submarginal groups quite characteristic, the oval pores being accompanied by 1–3 unmodified setae and 1 or 2 tubular ducts. No correlation whatsoever apparent between numbers of spines, tubular ducts and oval derm pores.

This description is based on a detailed study of 20 specimens from Kew Gardens, including two specimens from the type material.

Immature stages.—First and second instar nymphs generally resemble the young adult female in shape of body, conditions of anal opening, anal ring, anal lobes, and presence of antennae, legs, eyes and dorsal spines ; both have 6-segmented antennae, with finger-like setae on fourth segment. No obvious sexual differentiation apparent in these instars. *First instar* nymph small, about 450 μ long and 195 μ wide on hatching, and up to 600 μ long and 285 μ wide when fully grown at time of first moult. Legs short and stout, with tooth on claw hardly visible, probably absent. Dorsal spines in 6 longitudinal rows, well defined and regular on abdomen and thorax, but somewhat confused on head. The unmodified setae in reduced number, arranged in usual segmental transverse rows on venter. Oval derm pores arranged in a single subventral longitudinal row on each side of body, extending from third to sixth abdominal segments, each segment with a single pore in the row except the sixth which often carries 2. First and second abdominal segments each with one quinquelocular pore on each side, situated somewhat nearer median line than the oval pores. Ventral side of thorax with 2 longitudinal rows of pores roughly in line with inner margin of base of antennae, each row composed of 4 pores, one each medially at base of each coxa, and one behind base of antennae ; structure of these pores difficult to see, but at least postantennal ones definitely trilocular. One quinquelocular pore also present near opening of each spiracle. *Second instar* nymph about 675 μ long and 300 μ wide immediately after first moult, and up to 975 μ long and 450 μ wide when fully grown (at time of second moult). Legs longer and more slender than in first instar, and claw with small but distinct tooth. Second and especially third segment of antennae relatively longer than in first instar. Dorsal spines considerably more numerous, in about 8 to 10 longitudinal rows, the new, smaller setae being added and irregularly interpolated between the 6 rows of larger spines already present in first instar. The unmodified setae quite numerous and differentiated into longer and shorter ones on venter. Submarginal longitudinal rows of oval pores on 3–6 abdominal segments now composed of 1–2 pores on each segment in the row, and single pores occur irregularly on sternites of abdomen. Quinquelocular pores fairly numerous, scattered along whole of marginal area of body ; a few occur also on ventral side of thorax and on posterior parts of tergites, forming there rudiments of the transverse rows which are fully developed in the adult female ; 1 or 2 of these pores present near opening of each spiracle.

In female series second instar nymphs moult (second moult) directly into the young adult female ; in male series into the *third instar male nymph*, the structural detail of which is represented in figure 2. It has 7-segmented antennae, with the 3 apical segments distinctly narrower than the others ; fifth segment carries the finger-like stout seta. The acorn-shaped spines absent, except for rare occurrence of a single spine here and there ; instead, dorsum beset with rather strong pointed unmodified setae. Tubular ducts slightly smaller than those in adult female, about 12 μ long with the cup 3 μ deep and 4·5 μ in diameter ; very numerous, scattered all over dorsum. Distribution of oval pores, quinquelocular pores, and unmodified setae very similar to that of second instar nymph. The most interesting feature, however, is the presence in front of the anal opening of a transverse, slit-like structure with the appearance of the female genital opening, the vulva. This caused some confusion at first, because the presence of the vulvar opening is generally considered to be a reliable recognition character of the young adult female (before the eggs are formed). Careful observation of this, and of the following 2 instars (prepupa and pupa), has shown that it is a transverse pocket-like invagination of the derm with the margins (lips) well sclerotised, and from which, by a series of invaginations and evaginations in prepupal and pupal stages, the external male genitalia are formed.

Adult male.—No detailed study has been made of the adult males. They are dark red, robust insects, about 1115 μ long from tip of head to end of genital organs, about 375 μ wide at level of mesothorax, and the wing span 1770 μ. External genital organs at end of

abdomen broadly conical, about 150 μ long. Head with two pairs of simple eyes and 10-segmented antennae, the apical segments of which are globular (apparently characteristic for the Eriococcid male as opposed to elongated apical segments in the Pseudococcid male).

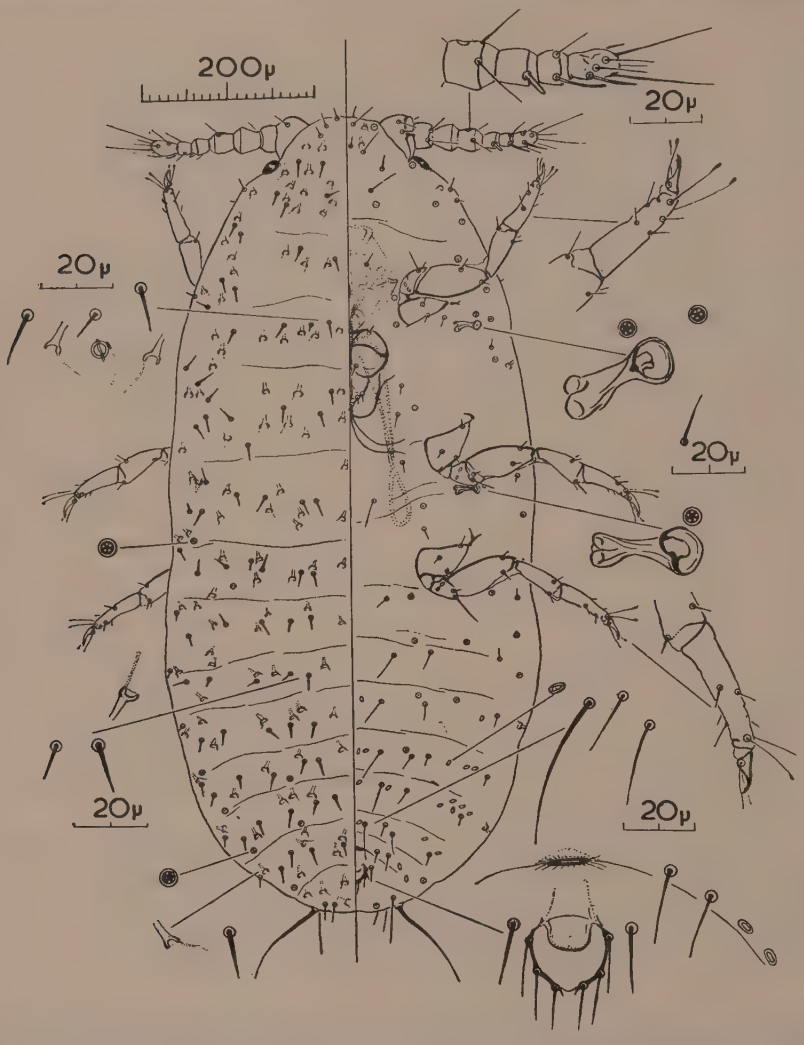


Fig. 2.—*Ovaticoccus agavium* (Douglas) on *Agave* sp. from Royal Botanic Gardens, Kew. Third instar male nymph.

Habitat.—On various species of *Agave*; the immature stages and the young adult females occur at the base of the leaves of the host plant, producing a small amount of waxy secretion ; at oviposition the female is enclosed within a copious, loosely felted, irregular mass of waxy secretion. The ovipositing females appear to have developed a gregarious habit, with the result that the individual waxy secretions coalesce, forming a continuous mass of loosely felted wax in the narrow spaces at the base of leaves, concealing numerous females

with their young progeny. The male puparia occur mainly on the lower surface of the leaves, apparently at any distance from the base; they are small, well defined, oval and closely felted. At the time of my visit to Kew Gardens in June, 1957, all stages were present. The insects were particularly numerous on a large old *Agave* sp., which—I was told—may well be the same specimen of *Agave* sp. from which Douglas obtained his insects.

One of the slides with the specimens of the type material in the British Museum (Natural History) was selected and marked as the lectotype. Part of the material on which the present study was based, including adult females and immature stages, will also be deposited in the British Museum.

Summary

Ovaticoccus agavium (Douglas, 1888) has been rediscovered in the hothouses of the Royal Botanic Gardens at Kew. The generic name and the composition of the genus, which at present provisionally includes nine species, is discussed. The amended definition of the genus as based on the type species is given, and the adult female redescribed and illustrated in detail on the basis of material which includes the type specimens; a lectotype is designated. The first and second instar nymphs are briefly described, and the third instar male nymph described and illustrated in detail. *Pseudantonia agaves* Chiaromonte, 1929 is conspecific and becomes a junior synonym of *C. agavium* Douglas, 1888.

References

Borkhsenius, N. S., 1949, *Fauna SSSR.* **7**, *Pseudococcidae.* 382 pp. Akad. Nauk., Moskva-Leningrad.

—— 1950, Tchervetsi i Shchitovki SSSR. [Mealy-bugs and scales of USSR (Coccoidea).] *Keys to Fauna of SSSR.* No. 32, 250 pp. [In Russian.]

Cockerell, T. D. A., 1896, A check list of the Coccidae. *Bull. Ill. Lab. nat. Hist.* **4** : 318–39.

—— 1899, Tables for determination of the genera of Coccidae. *Canad. Ent.* **31** : 273–9.

—— and Parrott, P. J., 1899, Contributions to the knowledge of the Coccidae. *Industrialist* **1899** : 159–65.

—— and Robinson, E., 1915, Descriptions and records of Coccidae. *Bull. Amer. Mus. nat. Hist.* **34** : 105–13.

Chiaromonte, A., 1929, Nota preliminare su una nuova specie di *Pseudantonina* dannosa all'*Agave sisalana* nella Colonia Eritrea. *Boll. Soc. ent. ital.* **61** : 18–24.

Douglas, J. W., 1888, Notes on some British and exotic Coccidae (No. 12). *Ent. mon. Mag.* **25** : 150–1.

Fernald, M. E., 1903, A catalogue of the Coccidae of the World. *Bull. Hatch agric. Exp. Sta.* **88** : 79.

Ferris, G. F., 1919, A contribution to the knowledge of the Coccidae of Southwestern United States. (*Leland Stanf. Univ. Publ. Univ. Ser.*). 68 pp.

—— 1921, Report upon a collection of Coccidae from Lower California. *Stanf. Univ. Publ. Biol. Sci.* **1** : 59–132.

—— 1955, *Atlas of the scale insects of North America* **7** : 182–3.

—— 1957, A review of the family Eriococcidae (Insecta : Coccoidea). *Microentomology* **22** : 81–89.

Kloet, G. S., 1944, A new generic name in the Coccidae (Hemiptera). *Ent. mon. Mag.* **80** : 86.

Lawson, P. B., 1918, Scale Insects injurious to fruit and shade trees. The Coccidae of Kansas. *Bull. Kansas Univ., Biol. Ser.* **18** : 161–275.

Leonardi, G., 1911, Contributo alla conoscenza delle Cocciniglie della Repubblica Argentina. *Boll. Lab. Zool. Portici* **5** : 237–84.

MacGillivray, A. D., 1921, *The Coccidae.* Urbana, Illinois.

Newstead, R., 1897, On *Coccus agavium*, Douglas. *Ent. mon Mag.* **33** : 12–13.

—— 1903, *Monograph of the Coccidae of the British Islands* **2**. Ray Society : London.

Gomez-Menor Ortega, J., 1954, Adiciones a los " Cóccidos de España " (tercera nota). *Eos, Madr.* **30** : 119–48.

Parrott, P. J., 1900, Scale Insects from Kansas grasses. *Bull. Kansas agric. Exp. Sta.* **98** : 133–46.

Vayssière, P., 1914, Note sur quelques Coccides nouveaux ou peu connus (Hem.). *Bull. Soc. ent. Fr.* **1914** : 206–8.

Zopf, W., 1887, Mycetozoa. *In* A. Schenk, *Handbuch der Botanik* **3** (2). Breslau. [*Gymnococcus*, p. 162.]

THE NEW ZEALAND GENUS *DUVALIOMIMUS* JEANNEL (COLOPTERA : CARABIDAE)

By E. B. Britton

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The genus *Duvaliomimus* was erected by Jeannel in 1928 (*Abeille, Paris* **35** : 83) for the species originally described as *Anchomenus walkeri* Broun. A second species, *D. brittoni* Jeannel, was added in 1938 (*Rev. franç. Ent.* **4** : 256). Two additional species have been collected recently in New Zealand and have been sent to me for identification. One of the new species is based on specimens discovered by members of the New Zealand Speleological Society in Waipuna Cave, Te Kuiti, in the North Island. It is of special interest in that it is the first true cavernicolous species to be described from New Zealand. As there are a number of limestone areas in New Zealand and caves must be numerous, it is to be hoped that the Speleological Society will make further discoveries of this kind.

Genus *Duvaliomimus* Jeannel

Duvaliomimus Jeannel, 1928, *Abeille, Paris* **35** : 83, figs. 1313–8.

Anterior tibiae pubescent on the outer side towards their apices; elytra without setiferous punctures on the fifth interval but with 3 setiferous punctures on the third, the 2 anterior punctures being in contact with the third stria and the apical puncture in contact with the second; the "recurrent stria", bordered externally by the apical carina, is continuous with the fifth stria; frontal grooves on head "complete", *i.e.* continued on to sides and ventral surface of head; fourth segment of all tarsi in both sexes with a long curved, bifid, membranous lamina beneath, extending as far as the apex of the fifth segment; eyes small; frons with 2 setiferous punctures on each side, above and behind the eye; mandibles without a premolar tooth (fig. 2); median tooth of mentum bifid (fig. 1); mentum separated from submentum (*pièce prébasilaire* of Jeannel) by a distinct transverse suture; submentum with 6 setiferous punctures; glossa bearing 8 long setae at the apex; paraglossae long, hyaline, finely ciliate on the inner sides. Pronotum cordiform, with posterior angles acute or square and with a single setiferous puncture on each margin level with the widest part of the pronotum. Elytra elliptical, shoulders almost or completely obliterated; scutellar striole present; striae impressed; 2 setiferous punctures on the third stria, situated at about one-quarter and one-half of the length of the elytra from the base; one setiferous puncture at the base of the second stria, very small setiferous puncture present at its apex; each lateral margin of the elytra with 8 setiferous punctures grouped as in *Duvalius*, *i.e.* 4 in a line just behind the shoulder, 2 close together near the middle and 2 near the apex of the eighth stria; in addition 2 setiferous punctures present close to the recurrent portion of the sutural stria; anterior tibia straight, with longitudinal grooves on their outer surfaces; anterior tarsi in the male with 2 basal segments about twice as wide as the third segment; parameres of aedeagus each with 3 apical setae.

Type species: *Anchomenus walkeri* Broun, 1903 [= *Duvaliomimus maori* (Jeannel)].

Key to the Species of *Duvaliomimus*

1 Pronotum elongate, ratio maximum width/middle length 0·95; antennae elongate, ratio length of antenna/length of elytra 1·30 or more; maxillary palpi elongate and eyes reduced so that ratio of length of terminal segment of palp to length of eye is *c.* 1·4; colour uniform testaceous; length 6·5–8·5 mm. (fig. 3) (*caves at Te Kuiti, North Island*) . . . . . **mayae** sp. n.

– Pronotum transverse, ratio of maximum width/middle length 1·15 or more; antennae normal, ratio of length of antenna/length of elytra less than 1·20; maxillary palpi normal, ratio of length of terminal segment of palp to length of eye less than 1·10; head, pronotum and elytra testaceous or piceous; length 5–7 mm. . 2

2 (1) Elytra with all striae equally obvious and equally impressed; elytral intervals distinctly convex 3

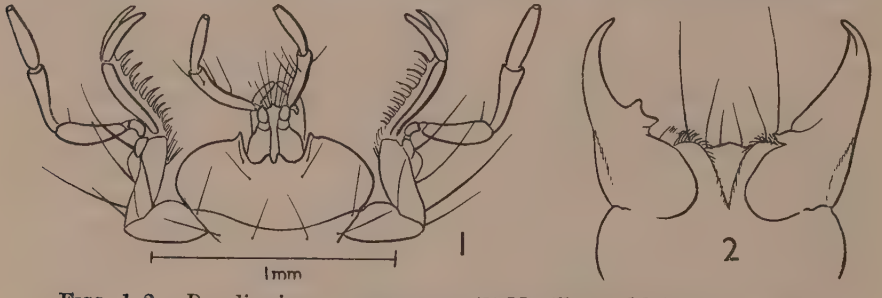
– Elytra with the sutural stria strongly impressed, the other striae becoming fainter towards the outer margins of the elytra, the outer 3 striae being very faint; elytral intervals flat; length *c.* 6·5 mm.; frons, pronotum and elytra black, antennae, mouthparts and legs reddish-brown (*southern mountains of the South Island*) . . . . . **brittoni** Jeannel

3 (2) Elytra with a slight trace of shoulder angles (fig. 4); eyes more convex (fig. 4); legs reddish-brown; length 6·2–6·8 mm. (*northern mountains of the South Island*) . . . . . **walkeri** (Broun)

– Elytra without trace of shoulder angles (fig. 5); eyes less convex (fig. 5); legs dark-brown; length *c.* 5·1 mm. (*Auckland District, North Island*) . . . . . **watti** sp. n.

Duvaliomimus mayae sp. n. (Figs. 1–3)

Length: 6·5–8·5 mm. *Colour:* uniform testaceous. *Head:* elongate, with mouthparts and antennae elongate in comparison with the other species, the antennae 1·32–1·37 times as long as the elytra; eyes very small, less than 0·2 mm. in length, approximately



Figs. 1–2.—*Duvaliomimus mayae* sp. n. (1) Maxillae and labium, ventral; (2) mandibles, ventral.

circular; ratio of length of terminal segment of maxillary palp to length of eye *c.* 1·4. *Pronotum* elongate, ratio of greatest width to middle length *c.* 0·95; posterior angles very acute; median line impressed; ratio of greatest width to width across posterior angles 1·4. *Elytra* elliptical, shoulders completely effaced; striae fairly uniformly impressed, intervals between them slightly convex. *Setae* on frons, above and behind eye, on lateral margins

of pronotum (one on each side) and on lateral margins of elytra, very long (*c.* 0·8 mm.). *Legs* elongate, length of tibia of posterior leg 0·6 times the length of the elytra (*c.* 0·5 in the other species).

Locality.—New Zealand : North Island, Te Kuiti, Waipuna Cave, 500 yards from the entrance, in a baited trap, holotype ♀, 2.xi.57 (*V. A. L. May*) ;

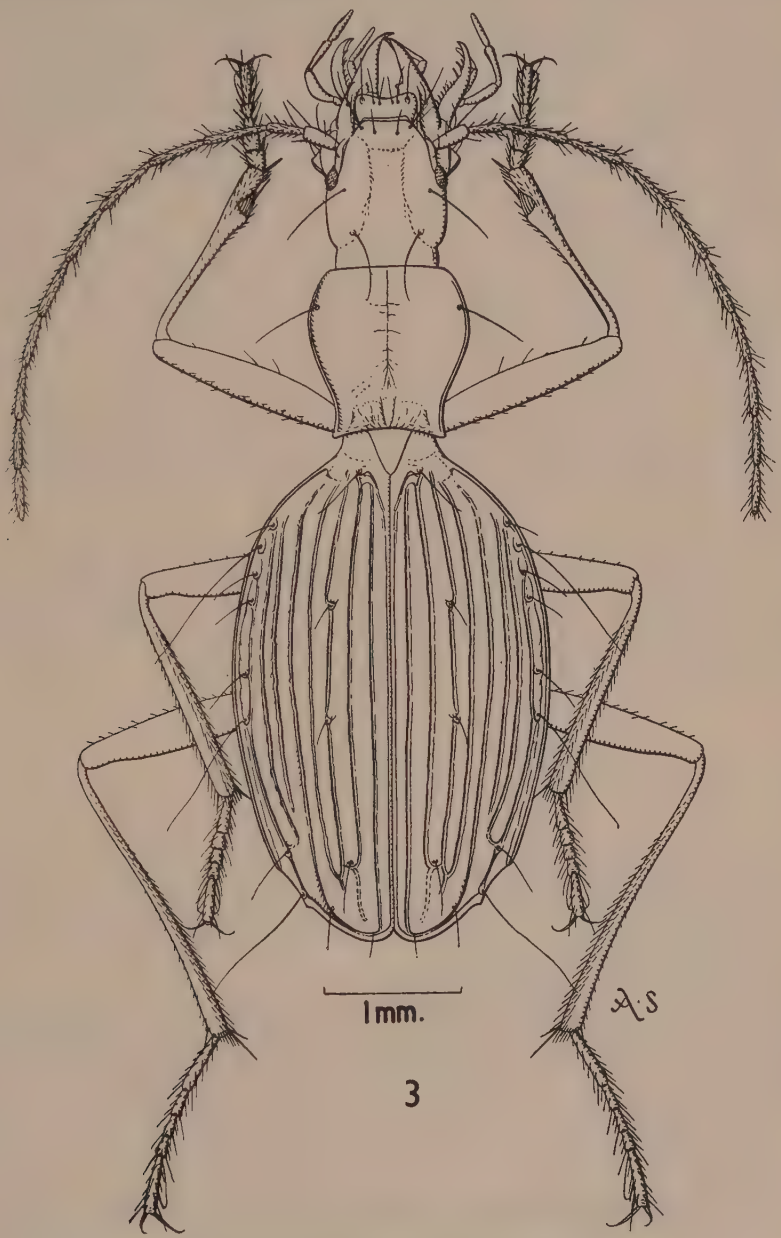


Fig. 3.—*Duvaliomimus mayae* sp. n. ♂.

paratype ♀, 23.ii.57 (*B. M. May*); 1 paratype ♂, 1 paratype ♀, 28.ix.57 (*F. Walton*); 3 paratypes ♀, 2.xi.57 (*V. A. L. May*).

Te Kuiti, Lucky Strike Cave, 150 yards from the entrance, in a baited trap, 5 paratypes ♂, 4 paratypes ♀, 6.iv.58 (*D. V. May*); 500 yards from the entrance, in a baited trap, 13 paratypes ♂, 26 paratypes ♀, 6.iv.58 (*D. V. May*).

Deposition of Types.—Holotype ♀ and paratypes in the collection of The Plant Diseases Division, Department of Scientific and Industrial Research, Mount Albert, Auckland; paratypes are also deposited in the Auckland War Memorial Museum, in the Entomology Division, Department of Scientific and Industrial Research, Nelson, and in the British Museum (Natural History).

The first specimen of *Duvaliomimus mayae* was taken on 23rd February in a baited trap which had been set on 9th December, 1956, about 500 yards from the entrance of Waipuna Cave. I have pleasure in naming the species after Mrs. Brenda M. May, who took this specimen and who kindly forwarded it to me for examination. Two more specimens of the species were found in the trap after an interval of seven months by Mr. F. Walton, on 23rd September, 1957. On 2nd November, 1957, the trap was revisited and four more specimens were taken by Mr. V. B. L. May. A series of 48 specimens has been taken more recently by Mr. D. V. May in traps in the Lucky Strike Cave which is half a mile from Waipuna Cave. The traps were of the type described by H. S. Barber[1] and were baited with a mixture of minced beef and grated cheese, Galt's preservative solution being used. Collembola, Isopods, Myriapods, Acarina, Opiliones and Orthoptera were taken in the traps in addition to the beetles.

Duvaliomimus mayae differs from the two species of the genus already described by the fact that it has the elongate head, thorax, antennae, legs, mouthparts and setae, and reduced eyes, which are associated with life in caves. Although no information is available, it is likely that the other species of *Duvaliomimus* will be found to live in damp situations on the surface.

Duvaliomimus brittoni Jeannel

Duvaliomimus brittoni Jeannel, 1938, *Rev. franç. Ent.* **4**: 256.

The species is closely allied to *D. walkeri*, the form of the head, eyes, pronotum and elytra and the proportions of legs and antennae being very similar in the two species. In particular the outline of the elytra shows the same slight trace of shoulder angles and the disc of the elytra (from suture to interval 4 on both sides) is similarly flattened.

Pronotum ratio of maximum width/middle length 1·27, ratio of maximum width/minimum width (at posterior angles) 1·70. Elytra ratio of maximum length/maximum width 1·40. Terminal segment of maxillary palpi *c.* 0·85 times as long as the eye. Easily distinguished from *D. walkeri* by the evanescent outer striae. Colour black with apical margins of elytra testaceous and appendages reddish-brown.

Localities.—New Zealand: South Island, mountains near Lake Wakatipu.

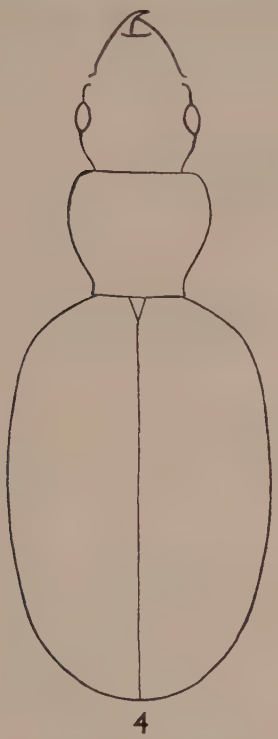
Type ♀ in the British Museum; paratype in the Paris Museum.

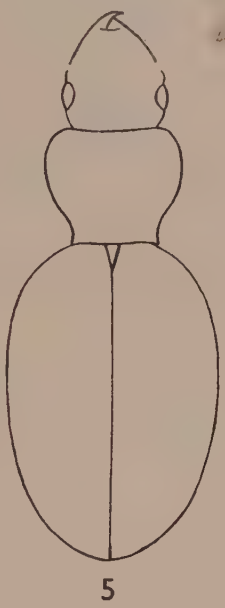
[1] Barber, H. S., 1930, *J. Elisha Mitchell sci. Soc.* **46**: 259–66, 1 pl.

Duvaliomimus walkeri (Broun). (Fig. 4)

Anchomenus walkeri Broun, 1903, *Ann. Mag. nat. Hist.* (7) **11** : 456 ; Jeannel, 1938, *Rev. franç. Ent.* **4** : 256.
Trechus maori Jeannel, 1920, *Ann. Mag. nat. Hist.* (9) **5** : 111; Jeannel, 1928, *Abeille, Paris* **35** : 83.
Duvaliomimus maori (Jeannel), 1928, *Abeille, Paris* **35** : 83.
Duvaliomimus walkeri (Broun), Jeannel, 1938, *Rev. franç. Ent.* **4** : 83.

Length : 6·2–6·8 mm. *Colour :* head, pronotum and elytra reddish-brown to black, apical margins of elytra testaceous ; appendages reddish-brown. Pronotum ratio of





Figs. 4–5.—(4) *Duvaliomimus walkeri* (Broun), outline ; (5) *D. watti* sp. n., outline.

maximum width/middle length 1·27 ; ratio maximum width/minimum width 1·60. Elytra ratio length/maximum width 1·45. Terminal segment of maxillary palpi equal in length to length of eye.

The species differs from *D. brittoni* by having the elytral striae all obviously impressed on the disc, with faint traces of puncturation. Striae 2, 3 and 4 are evanescent at their apices.

Localities.—New Zealand : South Island, Westport ; Greymouth , Mount Greenland, 4 ex. in British Museum. Type ♀ of *D. walkeri* and type ♀ of *D. maori* in the British Museum.

Duvaliomimus watti sp. n. (Fig. 5)

Length: 5·1 mm. *Colour:* head, pronotum and elytra and abdomen piceous; antennae and palpi dark reddish; legs dark brown. Head as in *D. walkeri* but with eyes less convex; terminal segment of maxillary palpi equal in length to length of eye. Pronotum ratio of maximum width/middle length 1·20; ratio maximum width/minimum width (just before the posterior angles) 1·70, posterior angles acute and sharp. Elytra as in *D. mayae*, without trace of shoulder angles. Elytral striae strongly and equally impressed, intervals convex. Elytral disc not depressed as in *D. walkeri* and *D. brittoni*.

I have pleasure in naming the species after Mr. J. C. Watt who collected the specimen and sent it to me for examination.

Locality.—New Zealand: North Island; Auckland District, Moumoukai Valley, holotype ♂, 24.iv.54 (*J. C. Watt*).

The type will be deposited in the Auckland Museum.

BRITISH MUSEUM NEPAL EXPEDITION 1954

Protoures et Diploures Campodéidés

par B. Condé
(*Université de Nancy*)

Au cours de l'expédition du British Museum au Népal en 1954, K. H. Hyatt a récolté deux Protoures et un Diploure Campodéidés qui m'ont été soumis par le Dr. Theresa Clay, du Département d'Entomologie du British Museum (Natural History).

Protoures

Depuis la description du *Protapteron indicum* Schepotieff, de Mahé, forme mythique que Rimsky-Korsakow (1911) a placée dans le genre *Eosentomon* sans toutefois la redécrire, aucun autre Protoure n'a été signalé à ma connaissance de la région indienne.

Des deux spécimens étudiés ici, l'un est un *Eosentomon* en mauvais état de conservation, mais qui ne peut être rapporté à aucune espèce décrite, l'autre est un *Proturentomon* également inédit.

Eosentomon hyatti sp. n.

Népal : Ulleri, 83° 44′ E., 28° 21·5′ N., 6000–7000 feet, dry soil in deciduous forest, coll. No. B5 : 1 ♀, 18.v.54. Holotype in British Museum (Natural History).

Tête, Thorax.—La région antérieure de cet animal est très endommagée : tête absente, prothorax et mésothorax amputés de leurs pattes ; la patte métathoracique gauche est intacte et son tarse porte une épine tergale.

Abdomen.—Tergites II à VI avec 12 poils à la rangée antérieure et 14 à la rangée postérieure (les p_8 présents) ; à la rangée postérieure du VI, les p_2 s'insèrent dans une encoche de la marge postérieure du tergite et sont égaux aux p_4 (29), eux-mêmes un peu plus courts que les p_3 (32). Tergite VII avec 8 poils à la rangée antérieure (les a_1 et a_3 manquent) ; à la rangée postérieure, les p_2 ne s'insèrent pas dans une encoche de la marge postérieure du tergite et sont 4 fois plus courts (6) que les p_4 (24–25), eux-mêmes un tiers plus courts que les p_3 (36). Tergite VIII avec une rangée antérieure de 6 poils et une postérieure de 9, dont 2 + 2 sont insérés un peu en avant des autres. Tergites IX, X et XI avec chacun une rangée de 6 poils courts ; les poils latéraux sont brisés aux 3 tergites ; les poils submédians et intermédiaires d'un même tergite sont égaux entre eux, ceux du tergite X étant sensiblement de même longueur que ceux du tergite IX, tandis que ceux du tergite XI sont au moins 2 fois plus courts.

Sternite VIII sans rangée antérieure de poils ; rangée postérieure de 7 poils. Sternites IX et X avec chacun une rangée de 4 poils (a_1, a_3) ; tous sont brisés, mais on constate qu'en IX l'embase de a_1 est beaucoup plus volumineuse que celle de a_3 et qu'en X les embases de a_1 et de a_3 sont subégales.

La squame génitale n'a pu être parfaitement observée ; cependant, la forme des processus sternaux est très particulière et ne correspond à celle d'aucune espèce connue. Le crochet proximal de ces processus présente un corps épais, progressivement élargi d'arrière

en avant, et une pointe brusquement rétrécie et très fortement recourbée vers l'intérieur ; dans la région distale de la pointe, le grand axe de celle-ci devient subparallèle à celui du corps du crochet. La portion moyenne des processus est étroite, à bords latéraux légèrement convergents vers l'arrière ; elle est prolongée par une expansion subsétiforme, progressivement atténuée, égale à un peu moins du tiers de la longueur totale du processus.

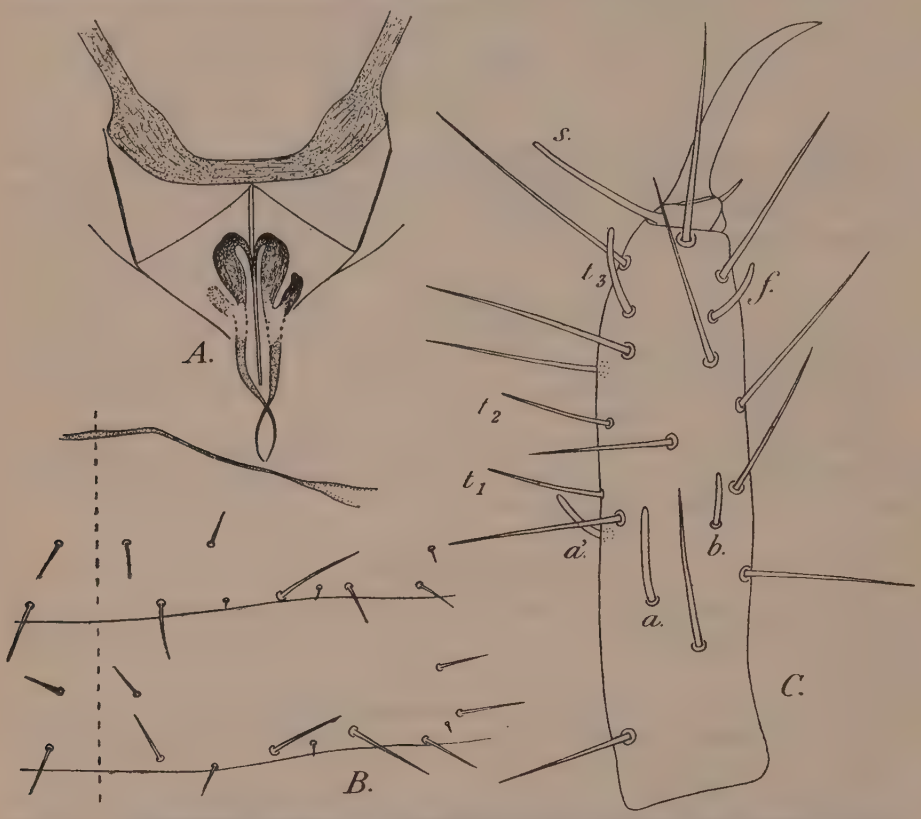


FIG. 1.—(*A*) *Eosentomon hyatti* sp. n., femelle de Ulleri (Népal). Squame génitale. (*B*)–(*C*) *Proturentomon regale* sp. n. (*B*) Femelle de Bakhri Kharka (Népal), chétotaxie des tergites abdominaux I et II. (*C*) Femelle de Sainte-Rose (Ile Bourbon), tarse I droit, face postérieure ; explication des lettres dans le texte. *A* et *C* × 2100, *B* × 1100.

Proturentomon regale sp. n.

NÉPAL : Bakhri Kharka, 84° 75′ E., 28° 23′ N., 5500 feet, damp mossy and grassy earth under shade of trees and rocks, soil moderately acid, coll. No. B3 : 1 ♀, 24.iv.1954. Holotype in British Museum (Natural History).

Remarque.—Cette curieuse espèce a été découverte à l'île Bourbon (La Réunion) par P. Remy, en juillet 1947. Elle semble abondante dans la région de Sainte-Rose (33 individus : 10 ♀, 12 maturus juniors, 6 larves II dont une en mue donnant un maturus junior, 5 larves I) et Remy l'a trouvée également à Saint-André (1 ♀), au Tampon (1 ♀, 1 larve I) et à Hell-Bourg (1 ♀).

Une comparaison minutieuse de l'exemplaire du Népal avec ceux de Bourbon m'a montré qu'il leur était parfaitement identique.

Longueur.—900 μ en extension médiocre ; 1025 μ pour une femelle de Sainte-Rose en extension totale.

Tête.—" *Pseudoculi* " légèrement ovalaires, divisés, ne présentant pas de prolongement postérieur. Le " filament de soutien " de la glande maxillaire est court ; sa portion distale, observée de profil, est coudée vers la face sternale de la tête et montre, du côté tergal, une dilatation rappelant celle que j'ai figurée chez mon *Proturentomon barandiarani* (1947, fig. 3*B*), mais moins accentuée.

Thorax.—Le pronotum porte une rangée de 6 poils dont les submédians et les latéraux sont subégaux, les intermédiaires étant au moins 6 fois plus courts. Le méso- et le métanotum, avec leurs régions pleurales, ont respectivement 22 et 20 poils, soit 8 + 8 à chacun des tergites. 3 + 3 aux pleures mésothoraciques et 2 + 2 seulement aux pleures métathoraciques. Chez le spécimen népalais, la moitié gauche du mésonotum possède 10 poils, les 2 phanères surnuméraires étant insérés le long de la marge latéro-postérieure du tergite.

Tarse I.—Long. : 53 μ. Griffe : 20·5 μ. TR = 2·5. Chez la femelle de Sainte-Rose longue de 1025 μ, le tarse est long de 57·5 μ et la griffe de 23 μ. Appendice empodial court ; sensille prétarsal *s* brisé non loin de la base chez l'exemplaire du Népal ; il est subcylindrique et bien développé chez les spécimens de Bourbon.

Face tergale, le sensille proximal t_1 et le sensille intermédiaire t_2 sont subsétiformes, dressés, presque rectilignes et subégaux ; le sensille t_3 est subcylindrique, beaucoup plus épais que les précédents et légèrement arqué.

Face postérieure avec 3 sensilles seulement, subcylindriques comme t_3 et sensiblement de même calibre, mais de longueurs inégales : *a* est le plus long (25) et *b* le plus court (14), *f* étant de longueur intermédiaire (18).

Face antérieure avec un seul sensille, *a'*, qui s'insère un peu plus proximalement que t_1 et paraît identique à *f*.

Abdomen.—Grandes pectines du tergite VIII avec environ 9 dents courtes. *Chétotaxie* (tableau ci-dessous). Rangée antérieure du tergite I avec a_1 et a_2 ; rangée antérieure des tergites II à VI avec a_1 seulement ; rangée antérieure du tergite VII avec a_3 seulement, ce phanère manquant unilatéralement (à droite ou à gauche) chez certaines femelles et un maturus junior de Bourbon. Au tergite I, les p_2 sont très courts, un peu moins longs que les p_4 ; aux tergites II à VI, les p_2 sont environ 3 fois plus longs que les p_4 (18/6 en moyenne) ; au tergite VII, les p_2 sont un peu plus longs qu'aux tergites précédents, mais plus courts que les p_6 (20/28) ; à ce tergite, les p_4 et les p_8 sont courts (6).

Au sternite I, les poils latéraux de la rangée postérieure sont très courts et fluctuants chez les femelles de Bourbon ; au sternite VIII, les intermédiaires a_2 sont plus courts que les submédians a_1, eux-mêmes plus courts que les latéraux a_3. Les appendices I et II sont semblables entre eux et munis chacun, sur leur article basal, d'une longue soie proximale et de 2 courtes soies subapicales ; l'appendice III, de forme habituelle, porte les mêmes phanères.

La squame génitale ne présente aucune particularité, mais on doit rappeler que les 14 adultes connus actuellement sont des femelles.

Nos. des segments	Tergites*		Sternites		Pleurites
I	a_4	p_{10}	a_4	p_4 (2)	2
II–III	a_2	p_{12}	a_4	p_6	3
IV–VI	a_2	p_{12}	a_4	p_9	3
VII	a_2	p_{16}	a_4	p_9	2
VIII	a_4	p_{12}	a_6	p_0	2
IX	a_0	p_{12} (10)	a_0	p_4	1
X	a_0	p_{10} (6)	a_0	p_4	1
XI	a_0	p_6 (4)	a_2	p_4 (0)	1
Telson	9		8 (10)		—

* Les nombres entre parenthèses concernent le stade maturus junior.

Affinités.—L'espèce est immédiatement reconnaissable à son tarse I qui ne possède que 7 sensilles en tout, ce nombre étant de loin le plus faible observé chez un Protoure adulte.

Diploures Campodéidés

Lepidocampa (*L.*) *weberi* Oudemans, 1890, ? ssp.

Népal : Siklis, 84°, 06′ E., 28° 22′ N., 7000 feet, sandy turf, coll. No. B1 : 1 ♂ jeune, long de 1·75 mm., 20–21.iv.54.

Tête.—Antennes de 17 articles, le sensille du IIIe postéro-tergal (entre les phanères *b* et *c*).

Thorax.—Au mésonotum, les macrochètes médiaux antérieurs sont presque une fois un tiers aussi longs que leur écartement (38/30) et leur apex dépasse largement les embases des sensilles sétiformes médiaux postérieurs ; au métanotum, ces macrochètes sont un peu plus courts que leur écartement (42/46), mais leur apex atteint celui des sensilles sétiformes.

Abdomen.—La marge postérieure du sternite I présente un champ ininterrompu de 85–90 poils glandulaires épais (g_1) disposés sur 2–3 rangs ; en avant de ceux-ci, on n'observe pas de poils glandulaires minces (g_2).

Sternite VIII avec 8 soies *C*, toutes longuement barbelées ; sensilles sétiformes *B* insérés à l'extérieur des soies *C* les plus latérales ; macrochètes fourchus à l'apex. Papille génitale avec 4 + 4 soies fourchues à l'apex, disposées en demi-cercle, et 12 soies simples formant une rosette autour de l'orifice génital.

La base des cerques, seule présente, porte des macrochètes complètement glabres.

Cet exemplaire est très voisin des 20 spécimens du Sikkim, de l'Assam et de l'État de Manipur récoltés en janvier et février 1952 par Mlle Th. Clay qui me les a très obligeamment communiqués. Ceux-ci proviennent des localités suivantes.

Sikkim (Nos. 127–128) : Gangtok, 6000 feet, rotting leaves and moss, 4 ♂, 6 ♀, 1 larve, 11.ii.52.

Assam (Nos. 114–115) : Kohima, Naga hills, 5000 feet, under stones edge of forest and moss from stones and logs : 1 ♀, 1 larve, 4 de sexe non reconnu, 29.i.52.

Manipur State (No. 111) : Kangpokpi, 4000 feet, under rotten logs and stones, oak wood : 1 ♂, 2 ♀, 25.i.52.

Tête.—Le nombre d'articles antennaires varie de 18, chez une larve ne possédant encore aucune soie *C*, à 27 chez 2 femelles ayant respectivement 11 et 16 soies *C* au sternite VIII.

Thorax.—Chez tous, les macrochètes médiaux antérieurs méso- et métanotaux sont très développés, quelquefois aussi longs que chez la ssp. *ceylonica* Silvestri (1933, fig. VII).

Abdomen.—Chez les spécimens ayant 1 à 9 soies *C* au sternite VIII, les sensilles sétiformes *B* sont insérés à l'extérieur des soies *C* les plus latérales ; chez un mâle à 10 soies *C*, les sensilles *B* sont juste à l'aplomb des soies *C* les plus latérales ; chez les mâles ou les femelles ayant 11 à 16 soies *C*, les 2 sensilles *B* (2 cas) ou au moins l'un d'eux (3 cas) sont insérés entre les soies *C* les plus latérales. Chez les mâles, les poils de revêtement de la papille génitale, à l'exclusion de ceux qui entourent le gonopore, sont barbelés ou tout au moins fourchus.

Chez tous les mâles enfin, la marge postérieure du sternite I porte des poils glandulaires épais (g_1) : une quarantaine sur 1–2 rangs chez le mâle à 5 soies *C* qui est le plus jeune de la collection, une cinquantaine sur 2 rangs chez le mâle à 7 soies *C*, 80 environ chez le mâle

à 10 soies *C* ; chez ce dernier, il y a en outre 25 poils glandulaires minces (g_2) formant une rangée en avant des poils g_1.

Le tableau ci-après résume une partie des observations mentionnées ci-dessus.

No. de la station	128	115	128	128	B1 (Népal)	128	128	128	115
Nombre de soies *C* .	0	1	5	7	8	8	8	10	11
Nombre d'articles antennaires	?–18	20–19	?	21–20	17–17	22–23	?–23	23–23	27–27
Papille gènitale .	0	0	♂	♂	♂	♀	♀	♂	♀
Nombre de poils glandulaires	0	0	.	.	.	0	0	.	0
g_1			env. 40	env. 50	85–90	.	.	env. 80	.
g_2			0	0	0	.	.	25	.

Les *L. weberi* étudiés ici se rapprochent de la ssp. *ceylonica* Silv., 1933, par les macrochètes médiaux antéreurs du méso- et du métanotum qui sont plus longs que chez le type défini par Silvestri (1931) et par les macrochètes de la région basilaire des cerques qui sont dépourvus de barbules. Toutefois, la présence de soies de revêtement barbelées sur la papille génitale mâle est un caractère inédit sur la valeur duquel il n'est pas possible de se prononcer. Il ne me semble donc pas indiqué de rapporter ces exemplaires à une sous-espèce existante, mais il serait certainement prématuré d'en créer une nouvelle pour les recevoir.

Bibliographie

Condé, B., 1947, Description de quatre Protoures nouveaux du Sud-Ouest de la France. *Coll. Mus. Zool. Nancy* **2** : 5–12.

Rimsky-Korsakow, N., 1911, Über die systematische Stellung der *Protura* Silvestri. *Zool. Anz.* **37** : 164–8.

Silvestri, F., 1931, Campodeidae (Insecta ; Thysanura) dell'estremo oriente. *Boll. Lab. Zool. Portici* **25** : 286–320.

—— 1933, First contribution to the knowledge of the Indo-Malayan Campodeidae (Thysanura Entotropha). *Rec. Indian Mus.* **35** : 379–92.

Book Notice.

University of California Publications in Entomology. Vol. 14, No. 2. The North American Sawflies of the genera *Acantholyda*, *Cephalcia* and *Neurotoma* (Hymenoptera, Pamphiliidae). By W. W. Middlekauff. 8vo. Berkeley and Los Angeles (University of California Press), 1958. Pp. 51–174, text illust. $2.50.

In this study an attempt is made to provide workable keys to the Nearctic genera of the family Pamphiliidae, with descriptions of all known species in the genera *Acantholyda*, *Cephalcia* and *Neurotoma*. A future paper will deal with the species of the remaining Nearctic genus *Pamphilius*, and complete the study of all North American Pamphiliidae, about which very little has been written previously.

The main body of the text (pp. 70–159) deals with the systematic arrangement of the family and provides keys to genera and descriptions of species.

In addition, there is a short historical review of the family ; notes on methods and techniques ; external morphology and terminology ; phylogeny and geographical distribution ; bionomics ; and classification.

The work is well illustrated and provided with an index of names and a good bibliography.

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